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Mathison Memorial Lecture.[1]

"THE BIRD OF TIME."

By E. S. J. KING,
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IT is my great privilege to deliver the seventh Mathison Lecture, and it is also indeed an honour to follow such exponents as W. A. Osborne, C. H. Kellaway, Reginald Webster and N. Hamilton Fairley. This lecture was inaugurated to commemorate one of the remarkable sons of this medical school. As one of the diminishing few who had an association with him, even though indirect, it seems appropriate for me to make more than passing mention of him as a man and as an individual. He will soon become a shadowy figure (even though giant in stature) of the past.

Gordon Clunes McKay Mathison graduated in 1906, and in 1908 he proceeded to England to spend some time working with Thomas Lewis and Ernest Starling, mainly pursuing research on the respiratory system. His papers in *The Journal of Physiology* (1910 to 1912) indicate his approach to and grasp of his subject (his bibliography is given by Webster, 1947). The fundamental differences between cyanosis and dyspnœa—the one due to oxygen lack and the other due to increased carbon dioxide—is now commonplace; but it required a discerning eye to make a distinction which is now readily recognized by the junior student. This part of his work appeals to me personally, specially since I can well remember when the distinction was first made in text-books and in the wards; and it has become the basis of much of our pathological physiology of the respiratory system. The degree of doctor of medicine in this university was conferred on him in 1911.

Having obtained the degree of doctor of science in the University of London, Mathison returned to Australia in 1913, but characteristically soon answered the call of his country and was with the Australian Imperial Force in Egypt and Gallipoli. It is one of the tragedies that on Gallipoli, on May 18, 1915, he should have died as the result of a cranial wound from a Turkish bullet. An indication of the general appreciation of his quality is shown by his appointment, in his absence, as the first director of the Walter and Eliza Hall Institute of Medical Research.

It may be mentioned as well that from pathology in Melbourne we also lost at this time Dr. S. J. Campbell on Gallipoli and Dr. Gilbert Lamble from illness. No doubt the shock of the loss of such irreplaceables has become dimmed by the extravagant wastage of two Great Wars.

[1] Delivered on October 2, 1956, at the University of Melbourne.

Whether at Naishápúr or Babylon,
Whether the Cup with sweet or bitter run,
The Wine of Life keeps oozing drop by drop,
The Leaves of Life keep falling one by one.

It has been the experience of this century that the rate of loss has been much greater than the usual "drop by drop", and one wonders how different the physiology and pathology of this country might have been if such as these had been spared for the normal span.

The arresting reflection is that Mathison achieved so much in so short a time. He appeared to be one of those who instinctively appreciated that

The Bird of Time has but a little way
To flutter—and the Bird is on the Wing.

He was truly a remarkable person. I was not personally acquainted with him, but several of my immediate seniors —the outstanding figures of their generation—often spoke of him, his zest for life and his capacity for achievement; a few sentences from Alan Newton or Charles Kellaway made him appear to come alive. His interests were wide and catholic. He was the same to all people; he was as much at home with the lowest as with the highest in the land—and equally interested in all. In the lecture room or on the campus, in the club or on the street, in the business office or the army camp he seemed equally at his ease.

Though Mathison's actions and attitude clearly were not motivated by Omar Khayyám's philosophy (his was an active and positive approach to problems), nevertheless many of Omar's reflections are peculiarly applicable to his curiosity about life and avid interest in its phenomena—social, political or scientific—and particularly his independence of outlook; it is for this reason that the foregoing and following quotations have been taken from Edward Fitzgerald's immortal "translation".

Our young country can ill afford the loss of such individuals, and it is essential that we should attempt, in such small measure as we may, to compensate for them. One reason for this lecture is that the young generation should be encouraged and stimulated to emulate such as Mathison.

And fear not lest Existence closing your
Account, should lose, or know the type no more;
The Eternal Sáki from that Bowl has pour'd
Millions of Bubbles like us, and will pour.

It is for us, by our own precept and example and also by reminding the community of its great men, to stimulate the potential investigators amongst our students.

The present lecture is intended to give a statement of work of the last decade. A study of the past has its very important place in our assessment of progress, and one of the most alluring activities, as indicated by the volume of "science fiction" literature of the last few years, is conjecture about the future. However, if work is to be done scientifically, and the importance of the scientific approach needs no emphasis, we know that we can only proceed almost from hour to hour.

Ah, but my Computations, People say,
Have squared the Year to human compass, eh?
If so, by striking from the Calendar
Unborn To-morrow, and dead Yesterday.

Mid-Twentieth Century Pathology.

It is well recognized that human activities are increasing at an astonishing rate, illustrated graphically as an exponential curve. In the present generation, therefore, we are faced with multitudinous developments in widely separated fields; but one of the outstanding features has been the recognition of the happily close relation between apparently divergent ones. Thus, modern work on the nature and structure of the atom has clarified problems in astronomy and vice versa, an example of the integration of knowledge in the largest and smallest of the objects with which scientists deal.

Similarly, in biology, and in our own field of pathology, widely divergent methods of study, fortunately, are found to be interdependent and, as indicated by the results achieved, to be closely related. Hence, we will discuss several of the advancing frontiers (which, because they are changing, are the most important at the moment) rather than a single one, and exemplify them by work which is being carried out in the department of pathology in this university.

One of the striking observations, doubtless of special interest to the historically inclined, is the manner in which methods of study show cyclic activity. Methods employed intensively, after a time, are regarded as "worked-out" and are then discarded for others; nevertheless, after a time, they return to favour; but that this should apply to simple direct observation in an age of increasingly complex machines may be regarded as a matter for astonishment. Not that the complicated mechanisms are not useful adjuncts; in fact, as will be seen, they are becoming increasingly important in biological studies; but at the same time, much can still be learnt by the simplest methods of observation. For convenience, the various subjects to be discussed will be considered in groups according to techniques which are employed—morbid anatomy, histopathology and chemical pathology.

Morbid Anatomy.

Although, as was mentioned earlier, it is not intended to discuss the historical aspects of the problems, it is important that we should recognize clearly the vehicle in which we are travelling and understand why it should be chosen rather than some other.

In the last century, as a natural expansion from the tremendous developments of the preceding three centuries, anatomy was the main study. It is easily understandable, however, that over such a period it should become self-sufficient and self-important and correspondingly rigid and limited. Not only was its extent arbitrarily restricted, but it had become a mass of minutiæ without the organization necessary to make it easily comprehensible and usable. Thus, the criticisms which were developing towards the end of the nineteenth century, and which were to become louder and increasingly ostentatious in the next few years, were at least partly justified. However, the objections should have been levelled, with any justification, at the misuse of a type of study rather than at the method of study itself.

The development of physiology with the much greater use of the experimental method introduced a new era, and it was at a relatively early stage of this fresh activity that Mathison worked. Physiology, however, has now become a mass of experimental data which are becoming increasingly difficult to encompass and comprehend, and which demand an integrating genius such as a Darwin, a Virchow or a Mendel.

Pathology uses both (including biochemical) techniques and contributes in turn to them. It has retained morbid anatomy—at the expense of being called a study of "dead meat" (one of the clichés to be put in the same category of modern misrepresentation and "guilt by association" as such political terms as "socialism", "fellow-travelling", "big business" and the like). That the study of dead tissue does not inevitably imply that the subject is dead has been frequently demonstrated by the many examples of false prophesies that "there is nothing more to be learnt" by simple observation—the unwise prophet being confounded by a discovery of major importance, sometimes within a few months.

Emphysema.

Emphysema is a subject in which there has been little or no progress for several decades. The problem has been attacked from many different aspects, but it has gradually become apparent that clarification cannot be expected until more basic information is available.

Anatomical studies of a limited type were made over a century ago, and little more than this is available today. There has been considerable investigation of histological detail, but the general relation of emphysematous bullæ to anatomical structures has not been followed. The

reason for this lies partly in the complexity of the lung structure itself and in the confusion due to the close intermingling of neighbouring terminal components, but in addition probably is due largely to the technical difficulties of maintaining, in histological material, the relation of the delicate continuous walls of dilated alveoli and bullæ.

During this century, as with many other conditions, dependence has been placed on the study of changed physiology and particularly on the application of the experimental method. In our present state of knowledge there are definite limitations of technique, and it is necessary for relatively large areas of a lung to be investigated at any one time; there have thus developed assumptions that various parts of a lobe, for example, are comparable. Furthermore, errors have crept in owing to a lack of precise knowledge of the actual structure.

The difficulty here is similar to that seen in the kidney. It is possible to determine the sum of functional activity of the components of a kidney; but to imagine that the mythical average glomerulus or nephron that can be derived from this estimation bears some or any relation to reality is not only a misleading but also a thoroughly stultifying proposition. With present-day techniques it is not yet possible to do more than guess what is happening in any one glomerulus or nephron. Similarly, we have no possibility of determining functional activity of some small emphysematous bleb or bulla, so that what information we obtain by these experimental means is unlikely, with present techniques, to give us any indication of modes of development.

It is important to remember that emphysema is an end result, and since it is notoriously difficult to maintain any degree of control in "chronic" experiments, the difficulties of satisfactorily applying the experimental method to the investigation of this disease are very great.

We thus come back, of necessity, to a study of the structure, and here it has been found by K. H. McLean (1956) that there are clear-cut observations of considerable significance which have been overlooked.

The tissues are investigated by serial sections, which allows reconstruction of the areas of emphysematous lungs. The technical difficulties are great; but special attention to early fixation and the application of modern modifications of embedding techniques have facilitated the production of some beautiful preparations.

Careful study of the structures shows that the emphysematous areas are essentially similar (differing only in the stage of development and the degree of involvement of tissue) in different parts of the lung, and a very important observation with far-reaching conclusions is that the generalized forms of emphysema are also essentially similar—that is to say, they are composed of multiple focal lesions.

The changes develop in the lobule by dilatation of alveoli. The reason for this dilatation can be demonstrated as following changes in the distal bronchioles. It is commonly stated that this is the result of bronchiolar plugs (of mucus and cells), which allow ingress but inadequate egress of air. This would explain the building up of pressure which causes distension of alveoli.

It has been shown by McLean (and it had been mentioned also by occasional previous workers) that this is an artefact. If intravascular fixation is carried out early—that is to say, within an hour or two of death—this appearance is not found. The essential feature of emphysema is a complete obstruction of some of the bronchioles, the dilated alveoli being supplied with air through alveolar pores from adjacent bronchioles.

These and related observations not only have greatly clarified the morbid anatomy of this subject, but have led to the development of a rational hypothesis on the ætiology of emphysema; for the details of this, reference may be made to the original papers (McLean, 1956, *et sequentes*).

This accumulation and integration of observations on a complex chronic disease, which has been a mystery for so many decades, is a beautiful demonstration of the importance and value of the simple and direct type of observation.

Glomus Tumours.

The internal glomus bodies, such as the carotid body, jugular body and aortic body, amongst others, have been long recognized; but some of them, such as the pulmonary body and the vagal body, have been known for only a short time.

In the case of some of them, recognition was achieved after attention had been drawn to them by the observation of tumours in their region. The study of these tumours is thus important in suggesting a search for the originating body, but also is, of course, increasingly significant, since, with more frequent and more careful examination of material, especially that removed at operation, more of the rarer lesions are being observed, and thus their accurate recognition is becoming more important.

It is clear from the observations of the last two or three decades that there are still more normal structures of this type to be found probably in the nerves of the neck and thorax, but also possibly in other parts of the body.

The main work regarding these bodies appears to have been done, and it is largely now a matter of accumulation of information, which requires industry rather than any special insight into fundamental propositions. At the same time observations being made on the carotid body by J. H. W. Birrell (1955) in various conditions of anoxia and acidosis, indicate that there is still also much to be discovered regarding structural alterations in these bodies; this will in turn augment or stimulate further studies on their function. It is important always to remember that the naturally occurring condition is the "natural" experiment, and that, provided sufficient information regarding variables is forthcoming, this may be as valuable as, or even more valuable than, many artificial experiments.

Histopathology.

In histological examinations, the direct study of tissues and their components is modified and assisted by the development of new techniques and by the increasing and widening use of new stains.

Much of our present knowledge of staining technique was discovered a century ago—many of our most satisfactory stains are the oldest. At the same time, these were discovered empirically and before any real appreciation of their chemical action was known. Since then a great change, depending on advances in basic chemical knowledge and in other fields, has occurred, particularly in the last two decades. Thus from empirical staining we have come to a new science, histochemistry. This is still in its infancy; but progress is sufficiently great to enable us to view the almost immediate future with expectation of many new discoveries.

These additions to our armamentarium have a synergistic action with other methods. Once special areas or structures are clearly delineated, these can often be seen and recognized either without staining or by means of some other method of examination. A combination of methods gives much more information than the sum of the various ones used independently, and also suggests further lines of study.

It is not proposed to discuss histochemical theory or technique here in detail, but merely to emphasize the significance of morphology and the importance of its being dynamic—that is to say, the need for taking advantage of any adjunct which will widen its scope.

New stains are being introduced every year, and practically all of them differ from the original ones such as hæmatoxylin in that they have a clearly defined chemical formula—indeed, many of them are synthesized. Incidentally, chemical purification of a component of Weigert's elastic tissue stain has greatly enhanced its specificity and value. Two stains which have come into routine use recently are Alcian blue (for mucins) and Loxol-fast blue (for the demonstration of myelin in nerve sheaths). Such

stains are important in two ways: (i) they sometimes provide a method of demonstration of chemical constituents of cells or intercellular material not shown in the same way by others; and (ii) they make techniques more easily and more generally applicable, perhaps, for example, by the abolition of the necessity for special fixatives.

Recently a study of the changes occurring in animals following ingestion of the sweet pea (*Lathyrus odoratus*) has been undertaken in the department of pathology. The histological study by D. W. Menzies and K. W. Mills, who used these techniques, has thrown considerable light on the subject of the nature of the change in the ground substance.

Some time ago Erdheim described a change in the media of the aorta, but the detailed nature of this was uncertain. By use of the periodic acid Schiff reaction and others known to be influenced by changes in materials in the ground substance, it has been shown that alterations take place in the chondroitin sulphuric acid component, and thus the nature of the change is beginning to be understood.

An important contribution here has been the observation that the fundamental changes in ground substance both in the aorta (where dissecting aneurysms develop) and in the cartilage at the end of long bones (where various structural abnormalities arise) are fundamentally similar.

The experimental approach here has been particularly valuable, and in one regard has thrown considerable light on some of the changes. It was observed that in animals used, all of which have a high metabolic rate, post-mortem change was rapid, and considerable alterations occurred in the regions where the changes being investigated took place. This suggested that it would be important, as it is in very many other conditions, to obtain the earliest possible material in man. This has been done by obtaining some material from surgical operations, and it has thus been shown that some of the changes regarded as characteristic of dissecting aneurysm of the aorta are in fact due to post-mortem change.

Investigations of changes in the brain stem and spinal cord in poliomyelitis have been undertaken in order to facilitate the recognition of minimal changes in this disease. This has become necessary in the testing of vaccine to exclude the presence of live virus.

Although it was assumed that culture of the virus from suspect material would be a much more delicate test than histological changes, in fact it has been demonstrated that, in monkeys, changes are discovered in cases in which clinical disturbances are minimal, and in the same order of dilution of the injecting agent as is demonstrated by culture methods.

Here we have the everyday, practical application of simple morphological information of the old-fashioned type.

An investigation by C. T. Pringle on the histochemical differentiation between the bundle of His and ordinary cardiac muscle for the clear differentiation and demonstration of lesions of the bundle is a further example of the importance of the histochemical method. By the use of a special histochemical technique (in which acetylthiocholine is used), he has demonstrated that the presence of cholinesterase is confined to the heart muscle cells in man, dog and monkey, and has hereby provided a clear histological demonstration of the bundle. This gives a clear idea of the possibilities of this method of approach.

Microdissection.

Microdissection has been employed in several organs in various circumstances; but so far as pathology is concerned, it has been most rewarding in the kidney. The pioneering work and much of our edifice of knowledge are due to Jean Oliver.

Here is an excellent example of the significance of the integration of different approaches to problems. On several occasions after parts of the organ have been dissected and changes in their structure clearly defined and understood, the significance of some of the appearances in histological section has become clear. This was particularly true in a recent investigation by Dora Bialestock (1956) on the nature of certain developmental cysts in the kidney. The interpretation of certain histological appearances became easy once the individual nephrons had been separated and examined. Incidentally, an important contribution made by the use of this technique was that the "lower nephron nephrosis" (one of the remarkable and extreme aberrations of twentieth century clinico-pathological investigation) has been shown, no doubt to the unbounded delight of generations of intimidated and dismayed students, to be a chimera.

Cytology.

As was previously stated, modern biology depends in a very great degree on modern technology, and in no field is it more apparent than here. With the perfecting of lenses and the application of various aspects of light physics, it has been possible to explore the cell and its nucleus down to mitochondria and related protoplasmic bodies; but, as always happens, the clarification of each problem makes it easier to perceive that there are further complex and intricate relations to be elucidated.

For some decades now it has been recognized that light waves are far too coarse to allow adequate investigation of the finer components of the cell, and at the same time it has become appreciated that we cannot remain satisfied with general propositions regarding aggregates of material, but that it is necessary to disentangle the very molecules (and possibly later the atoms) of the cell. This can be done in part by chemical means, with the aid of high-speed refrigerated fractionating centrifuges; but within certain limits this line of attack is greatly facilitated by a simultaneous investigation of the minute structure of the tissue.

The great importance and, in recent years, the tremendous increase in use of the electron-microscope are indicated by the bourgeoning literature. There was a time, about a century ago, when it began to be appreciated that it was desirable that any good teaching or research department should possess a microscope. We are now in the same position with regard to the electron-microscope, and the numbers of these instruments are rapidly increasing in this country.

A great deal has already been achieved. Knowledge of the internal structure of bacteria and even viruses is something that, certainly as far as the second is concerned, was not even imagined a decade ago. The numerous discoveries of the last few years have opened quite new fields. Some of them are of fundamental importance to biologists of all kinds.

One interesting point here is that for a time the method of investigation was in danger of taking control. It was not appreciated that if materials were magnified up to 200,000 times, the observer was then on a new plane. He did not have the normal yardsticks, and thus the interpretation of many of the appearances was specially difficult. Indeed, some quite extraordinary mistakes arose from this simple lack of known phenomena for comparison. It is clear that it is desirable and probably essential that progress be made by the use of lower magnifications, with gradual increase in the degree of magnification as experience is achieved. It is quite unnecessary to use an instrument at the limits of its powers of resolution merely because these are available.

A picture of a structure or tissue is obtained because parts of it are a little more impenetrable to electrons than others. As far as most materials are concerned, particularly in animal or plant tissue, the similarity in density (in relation to electron penetration) is too close to allow satisfactory delineations of structure to be obtained. When individual bodies—for example, viruses—are studied, these may be "shadowed" by some heavy metal (usually uranium) and thus show up clearly against the background. Ordinarily this method cannot apply to the sections, since it depends on the elevation of the object above the surroundings to catch a larger proportion of the metallic atoms and also to throw a shadow. More recently the application of the use of materials containing large

molecules with an affinity for different parts of the tissue has been scrutinized with the idea of increasing the scope of study; but these "electron stains" are not yet developing in a way which gives much encouragement for their playing an important part here in the immediate future. Osmic acid as a fixative for routine use is the simplest and, as yet, the sole satisfactory material in this field. One important point is that many histologically recognizable features are intentionally produced artefacts. In ordinary histological work, various methods of fixation are used and act as mutual checks on their relation to the living tissue; furthermore, examination of unfixed material by phase contrast is a further control. With electron-microscopy, as indicated, fixation methods are limited, so that some conclusions may well have to be reviewed in the next few years; that is to say, electron-microscopy is travelling along a path similar to that of light microscopy of the last century.

It goes without saying that the earliest possible fixation and meticulous attention to technical details in the preparation of material are essential prerequisites to good results. Observations have been made on the chemoreceptor cells in the carotid body, and problems not adequately solved by the light microscope have been disposed of rapidly and easily. Mitochondria of various types have been demonstrated in forms not previously appreciated. Changes in these structures in conditions of anoxia are being studied. A characteristic cytological appearance, found in the specific cells, has been observed also in the cells of the olfactory mucous membrane. It is found also in nerve cells at synapses. This is interpreted as the morphological characteristic of chemoreceptors, and again emphasizes the importance of the morphological approach to problems.

It has several times been suggested in the last decade that it would be advantageous to humanity if, as far as physical research is concerned, we could retrace our steps. That is clearly impossible.

> The Moving Finger writes; and, having writ,
> Moves on: nor all your Piety nor Wit
> Shall lure it back to cancel half a Line,
> Nor all your Tears wash out a Word of it.

All of the progeny of modern nuclear physics are necessarily related, and whether the advantages to be gained equal or outweigh possible disadvantages depends entirely on the manner in which we react to this challenge. The aspect of electron physics at present discussed should be one which, though causing temporary technical and interpretative difficulties, could be an unqualified advantage.

Histospectrophotometry.

The recognition of substances and solutions by the wave bands which they absorb in the visual, the ultraviolet or the infra-red sections of the spectrum has become a commonplace—the spectrophotometer is in routine use in most laboratories. The application of this method to the examination of individual parts of sections of tissues is relatively recent. Although considerable work has been done in the recognition of desoxyribonucleic acid, this and similar methods of investigation have become of great value as an adjunct to the various forms of histochemistry already discussed.

Chemical Pathology.

The study of chemical changes occurring in pathological states dates back several decades, and it has been on the plane of routine investigation, as clinical biochemistry, for forty years. The detailed study of enzyme activity, however, is of more recent development. With the elaboration of the Kreb's cycle of respiratory enzymes, a new field of study has been unveiled. It has been possible to show that damage to cells may follow a well-defined pattern which is not indicated in any way by the gross morphological changes seen by the microscope.

This has been clearly demonstrated by G. S. Christie, who has been studying the effects of some hepatotoxic substances which occur in Australian plants. This arose out of a study by Dr. L. B. Bull and associates at the Animal Health Section of the Commonwealth Scientific and Industrial Research Organization in Melbourne, in which various plants poisonous to sheep had been studied over several years. One of the most important was heliotrope (*Heliotropium europæum*). The toxic principle (a family of pyrrolizidine alkaloids) is available in pure form, and the poisonous effects on the liver with destruction of liver cells and, in chronic cases, the development of cirrhosis have been clearly demonstrated.

One of the active alkaloids—heliotrine—has been injected into rats, and the effect on the liver has been determined in detail by examination of the results of incubation in a Warburg apparatus of homogenates of liver tissue with various appropriate substrates. It has been shown that, whereas a poison such as carbon tetrachloride affects all the enzymes in the liver cells, other poisons such as those mentioned affect only, or mainly, certain ones only, so that a pattern of enzyme damage occurs in the cells which appears to be characteristic for the particular poison.

Thus, several states of liver cell damage which, on the plane of present-day morphological study, are indistinguishable or, if slightly different, do not present features which can be regarded as significantly distinctive, are readily segregated by the chemical investigation. In some cases there is a morphological counterpart at the extreme limit of microscopic vision merging into the submicroscopic in the form of mitochondria of various sizes; but whether a submicroscopic counterpart of these patterns will be demonstrable by the electron-microscopes still remains to be seen. However, it is obvious that it is now possible to carry out our investigations on a quite different plane from that which we have become accustomed to accept as adequate.

The technical requirements of this procedure, such as the maintenance of materials at low temperature (about 0° C.) during manipulations including centrifugation, limit its use at present as a routine investigation. Rise of temperature of merely a few degrees, due to friction during the short period of spinning, will vitiate a result.

> A Hair, they say, divides the False and True.

With the present rate of progress of such techniques, however, this method of approach is likely soon to come into routine use.

Another subject of study has been that of the pigments in chloroma. The green pigment has long been known to be present in white cells; but it has now been demonstrated that this is actually in the mitochondria of the cells (rather than in the nucleus or protoplasm), and its nature, which seems to be related to bile pigments, is being investigated.

The astonishing progress in the last few years in the knowledge and use of paper chromatography and chromatographic columns of various substances, counter-current apparatus and electrophoresis in general, is an index of the rate of development generally. It is unnecessary to mention these in detail; but it is noteworthy that such methods are now incidentally successfully applied in several investigations, and a previously insoluble problem has been reduced to one of relatively simple objectives.

The separation of chemical substances closely related to each other not only chemically but physically has been employed in the separation of various metabolites of phenobarbitone by N. E. W. McCallum. Until recently there was a discrepancy between the amount of drug taken by mouth and that recoverable from excreta, which was not explicable by any demonstrable breakdown products. This has now been, at least partially, clarified, and the signposts to further exploration are clearly marked.

Recently the question of the particular part of the cell specifically affected by carcinogens has been pursued, and easily recognizable carcinogens, such as butter yellow (dimethylamino-azo-benzine), which produces cancer of the liver in rats, has been studied by P. Hughes. Separation of the proteins of the liver cells, shortly after the time of introduction of the dye, shows which fraction contains the dye and thus presumably the cell fraction affected by it.

This is an approach to the question which would have been impossible even a few years ago.

When any of this work is closely studied, the outstanding feature is its dependence on the simultaneous application of various methods of approach. In many cases, primarily one technique is employed; but always at some vital point the application of another technique is essential to enable the investigator to surmount a hurdle. After this he can then progress for a considerable time by his original method. In other cases several frankly distinct techniques are required at the same time. This is a matter that requires urgent attention, because in this age there is widespread impulse toward and even necessity for intense specialization. In all research work it is essential that some appreciation of the "general practice" of the work should be retained. Here it means that, whatever field the investigator intends to pursue, it is vital that he should have a good and adequate grounding in basic studies.

Incidentally, one of the very satisfactory features of a busy research department where different approaches and types of investigation are being employed is that the interest of colleagues and their willingness to help provide a view of one pleasing aspect of human nature.

PERORATION.

We are at a time when knowledge of all kinds is advancing faster than ever before—indeed, so fast that it is only with difficulty possible for any of us to keep reasonably informed of our progress in even adjacent fields of activity. At the same time, all branches of science are interrelated and influence each other—as indicated by the necessity for our using the most recent technological discoveries and improvements.

One point that I have wished to make specially is that the role of direct observation is as important as it ever was. All of its exponents may not be in the first rank, but it constitutes one of the corner-stones of any edifice of knowledge that we wish to build.

Whatever our approach, it is thus imperative that some of us, at least, must be imbued with the insatiable curiosity of Mathison and, even without his genius, be actively interested in all fields which might affect our own. He would have revelled in these times. Furthermore, we must so guide our students in this tradition that the suitable ones are able to follow in the footsteps of their illustrious forebears.

We need those of single purpose. The distractions of today are more numerous than ever.

> Some for the Glories of This World; and some
> Sigh for the Prophet's Paradise to come;
> Ah, take the Cash, and let the Promise go,
> Nor heed the rumble of a distant Drum!

These quatrains of Omar have been variously interpreted, the schools of thought ranging from simple materialism to mysticism such as that of orthodox Sufism or nineteenth century Calvinism. Amongst these various interpretations it is not unreasonable that we should have our own, so that, in the present case, we can regard the "Cash" as the pleasure in work well done and the results achieved; and these must take precedence over other considerations if we are truly to succeed.

The example of Mathison encourages us to perhaps relatively puny efforts; but the opportunities are here as, it seems to me, they were never before:

> Oh if the World were but to re-create,
> That we might catch ere closed the Book of Fate,
> And make The Writer on a fairer leaf
> Inscribe our names, or quite obliterate!

When one considers the present-day possibilities for work with adequate salaries, the modern equipment to make the more "routine" tasks more easily and rapidly performed, technical assistance and the like, indeed there is presented to us a "fairer leaf".

Of course, the demand on potential investigators is great, not only in that they must renounce other activities, but also because the discipline is a strenuous and exacting one —often to be pursued without significant assistance from those from whom it might be expected.

> For let the Philosopher and Doctor preach
> Of what they will, and what they will not—each
> Is but one Link in an eternal Chain
> That none can slip, nor break, nor over-reach.

They must themselves have a scientific approach and an urge towards the discovery of the truth. That, despite the weight of precedent and established opinion, the truth will inevitably and inexorably reveal itself in an axiom which, fortunately, can be inculcated into our young people.

A few of the achievements of the last decade have been presented in a general way. This school (which in this lecture honours Mathison) is contributing its small part to the general sum of knowledge, and the enthusiasm of the present young workers indicates that before long this will be greatly augmented. It is for us not only to encourage that singleness of purpose and independence of outlook which are so important, but to foster that sense of urgency that is so essential an element in the constitution of the true investigator.

> Come, fill the Cup, and in the Fire of Spring
> The Winter Garment of Repentance fling:
> The Bird of Time has but a little way
> To fly—and Lo! the Bird is on the Wing.

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A METHOD OF FIXATION FOR MULTIPLE RIB FRACTURES, WITH REPORT OF A CASE.

By M. GLICK,
Sydney.

UNCOMPLICATED fractures of the ribs rarely require surgical intervention. However, when several ribs have been fractured, especially if the fractures have occurred at more than one site in each rib, an area of the chest wall may be separated within the limits of the fractures and give rise to a "floating" portion of chest wall with considerable paradoxical movement. This abnormal movement may interfere with the efficiency of respiration, especially as severe pain is likely to accompany both breathing and coughing. Such pain will limit movement on the injured side and predispose the patient to the collection of excess secretion in the bronchial tree. Atelectasis and infection

may follow and substantially interfere with the oxygenation of the blood. In such a case it may be a life-saving measure to overcome the pain and paradoxical movement by fixation of the floating area of the chest wall.

It is generally agreed that injuries to the chest wall are preferably managed conservatively. The surgical exposure required to obtain access and to permit individual repair of several broken ribs necessitates an extensive procedure. This will require lengthy anæsthesia and operation, with a fair amount of blood loss in a patient who may already be in a state of shock. Early ambulation of such a patient may be delayed. This is a disadvantage, as by early ambulation, efficient aeration and raising of secretions will be achieved.

In a comprehensive article on the stove-in chest with paradoxical respiration, Proctor and London (1955) have reviewed the literature and devised a thoracic stabilization frame for treatment of this condition. Both their patients had other injuries which necessitated their confinement to bed. If such is the case, the use of the frame is indicated. However, if the chest wall injury is the only feature, there is no reason to keep the patient in bed once fixation has been obtained. These factors were taken into account in the management of the following patient.

Report of a Case.

Mr. W., a motor-truck driver, aged forty-three years, was admitted to the Saint George Hospital, Kogarah. He had been involved in a motor-car accident, in which he was

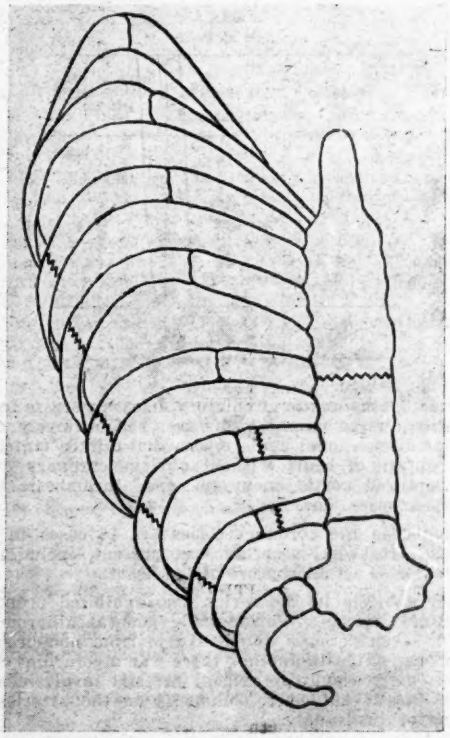

FIGURE I.

forcibly thrown forwards across the steering wheel. His forehead hit the windscreen, his chin came in contact with the instrument panel, but the brunt was taken by his chest against the steering wheel. There was a history of a brief loss of consciousness.

On his admission to hospital, he was in a state of moderately severe shock. He had a contusion on the forehead, and a laceration of the chin which required suture. Examination of the patient revealed an area of the anterior chest wall in the left upper region which was moving paradoxically and was causing him severe localized pain. The pain was aggravated by breathing, coughing and any movement. There was clinical evidence of fractures of the third, fourth and fifth ribs in the anterior axillary line, and there were fractures anteriorly or detachments from the sternum of the second and third ribs. In addition, movement could be elicited in the body of the sternum at the level of the fourth rib anteriorly. Of the several fracture sites, that of the sternum seemed to be the least painful. There was no evidence of surgical or mediastinal emphysema, pneumo-

FIGURE II.

thorax or hæmothorax, or of any interference with the heart or great vessels. There were a few bronchitic signs in both lungs, the breath sounds being diminished on the injured side. He had a cough and some clear frothy sputum. He had, therefore, multiple uncomplicated fractures of the ribs with a transverse fracture of the sternum.

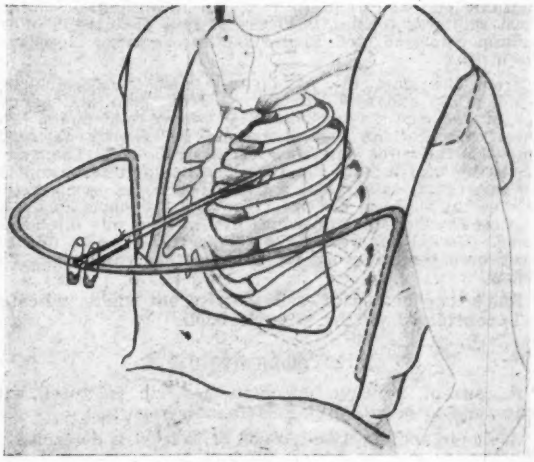

FIGURE III.

X-ray pictures of the chest, taken as they were by a portable unit, were not very helpful. They confirmed that there was no pneumothorax, fluid or emphysema, but did not indicate the fractures; in fact, the only fracture shown was one of the sixth rib, which had not been suspected clinically.

The problem was to overcome the paradoxical movement by fixation of the "floating" area of the chest wall, with as

little restriction of respiration as possible in view of the likelihood of respiratory infection. By the application of a pad and strapping alone, sufficiently extensive to control the area, even with local anæsthesia at the fracture sites to control pain, there would have been considerable restriction of respiratory movement. This would have caused a reduction of tidal air, vital capacity and the effectiveness of the cough reflex, all favouring respiratory complications. With this method there was also a risk of compression of the mediastinal structures, especially with the additional transverse fracture of the sternum. To expose all fractures and wire them individually was considered, it being realized that that would involve an extensive operation. It was decided to attempt to fix the "floating" area by traction, and if that did not suffice, then fixation of the individual fractures would be undertaken with separate immobilization of the sternal fracture.

Under general anæsthesia with intubation, the problem could be even better assessed, and the extent of the damage was as shown in Figure I, the paradoxical movement being exaggerated in the absence of the restricting effect of pain. The maximal area of the abnormal movement was in the region of the anterior ends of the third and fourth ribs. Traction on these was contemplated. Through a short transverse incision over the anterior end of the third rib, the underlying rib was exposed. The periosteum was incised and a stainless steel wire passed round the rib subperiosteally. It was passed round to facilitate subsequent removal. As soon as traction was applied to this wire, the paradoxical movement ceased and the "floating" area and sternum moved as one with the rest of the thoracic cage. It was decided that this alone would be sufficient. A further wire was passed around the same rib in case one wire should break. The wound was closed.

The next consideration was how traction on the wire could be maintained. Johnson and Kirby (1952) advised traction by attaching the wire to a cord and leading this over a pulley to the end of which a five-pound weight was attached. This or the use of the frame devised by Proctor and London (1955) would have confined the patient to bed, and as it was considered important to have him ambulant as soon as possible, another method was devised. This consisted of applying a light plaster of Paris framework, which did not encircle the chest, and in which was incorporated a steel rod, forming a half-circle forwards in the transverse plane of the thorax. To this the wires were attached. It was then observed that a constant pull on the wires caused movement at the fracture sites as the chest moved on respiration. The introduction of an elastic strip between the wires and the rod allowed some take-up on inspiration and restraint on expiration, so that the mean tension on the chest wall was constant. Figure II is a photograph of the fixation employed, and Figure III is a drawing to indicate the method.

From the start the patient was very comfortable; he could sit up and move about, free from pain, and he was out of bed and freely mobile in twenty-four hours. No chest complications ensued, and on the twelfth day after operation the wires were detached from the rod. The wound healed by first intention. His chest wall felt firm, and the wires were left detached as a trial. There was no suggestion of even the slightest discomfort, so that the whole apparatus was removed on the thirteenth day and he was discharged home. He did not work for a further three weeks, and has since been back at work for two months, without any disability.

Since this method is easily carried out where indicated, it is considered worthy of publication.

Summary.

A case of multiple uncomplicated rib fractures with transverse fracture of the sternum is reported.

A simple and effective method of fixation is described.

Acknowledgements.

I wish to thank Dr. D. J. Wurth, who referred the patient to me, Mr. R. Peir for the photograph, and Miss P. Boland for the diagrams.

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CORONARY ATHEROSCLEROSIS.

By GORDON OXER,

Kalgoorlie, Western Australia.

WHILST on a visit to Melbourne late last year I had the opportunity of seeing Dr. Keith Bowden in his laboratory, and in the course of conversation I remarked that in my experience there is only one heart disease of any moment, and that is coronary atheroma. Dr. Bowden agreed in general with this conclusion. In order to illustrate my point I have summarized the last 96 consecutive autopsies which I have performed, and give herewith a résumé of the findings. Records of earlier examinations are not available to me, so that the series is a rather small one, but none the less illuminating on that account.

The ages of the subjects, by decades, are shown in Table I, and a summary of the causes of death is given in Table II. In passing, some of the conditions noticed incidentally were as follows: acute pancreatitis as the cause of death in three cases, and chronic pancreatitis as an incidental condition in another; gastric or duodenal ulcer in three, and gastric carcinoma once; horseshoe kidney once; gall-stones in eight cases; renal calculi in three; enlarged prostate in five cases, one enlargement being a carcinoma and the cause of death; chronic pulmonary conditions in four; cirrhosis of the liver in only one case.

TABLE I.
Ages at Death.

Decades.	All Subjects.	Subjects with Circulatory Disease.
1	5	—
2	3	—
3	7	—
4	8	1
5	14	2
6	20	6
7	13	6
8	21	14
9	5	1
Total ..	96	30

The 30 deaths due to circulatory disease were as follows: obviously due to coronary disease, 25; obviously due to valvular disease, one; acute myocardial failure (infection), one; rupture of heart without obvious coronary disease, one; ruptured aortic aneurysm, one; thrombosis in pulmonary arteries, one.

Included in the coronary series are 16 cases in which obvious myocardial scarring was present, including two other cases of actual rupture of the heart.

Other subjects in the series also exhibited pronounced circulatory defects. Considerable general atheroma was seen in seven persons who had died from non-circulatory conditions, whilst in another there was myocardial damage without macroscopically evident arterial involvement. In five of the 96 autopsies, comments on the arteries were missing or inadequate.

One curious feature is the great difference seen occasionally between the thoracic and the abdominal aorta. Of the 96 subjects, in three there was considerable thoracic aorta atherosclerosis while the abdominal aorta was fairly clear; in five others the order of involvement was reversed.

Rupture of the heart or aorta occurred nine times in the series, four ruptures being due to violence, the remainder to medical conditions.

The state of the coronary circulation was noted in nearly all cases. When the coronary arteries were particularly

atheromatous, similar changes were usually obvious in the aorta and the cerebral vessels, although not invariably. The descending branch of the left coronary artery was more frequently and more seriously involved than its transverse branch, or the right coronary vessel, so that the main mass of the left ventricle was more subject than other parts of the heart to an impaired blood supply. Another important point noticed was the strict localization of atheromatous narrowing in these vessels. As the main purpose of this communication is to stress the importance of coronary atherosclerosis, I conclude by giving brief details of the more striking instances of this condition.

TABLE II.
Causes of Death.

Medical Deaths.		Violent Deaths.	
Condition.	Number of Cases.	Type of Violence.	Number of Cases.
Circulatory disease ..	30	Mine accidents ..	16
Pneumonia	15	Traffic accidents ..	10
Asphyxia (not due to violence)	4	Suicide	5
Abdominal disease ..	7	Other	7
Brain disease	2		
Total	58	Total	38

CASE 15.—There were two localized areas of almost complete occlusion in the left descending branch.

CASE 16.—The right coronary artery was uniformly narrow. There was almost occlusive but only patchy atheroma of the left coronary artery.

CASE 17.—The right side was normal. There was one large and almost occluding plaque in the left coronary artery.

CASE 22.—One small almost occluded section of the left descending branch was the only lesion, and the cause of death. All other arteries were healthy. The subject, aged forty years, dropped dead on the footpath.

CASE 28.—There was one area of severe constriction in the proximal part of the left descending branch. The subject was found dead in bed.

CASE 32.—The proximal 2·5 centimetres of the left main coronary trunk formed a calcareous mass with virtually no lumen. The remainder of the left coronary artery was fairly healthy.

CASE 42.—There was very gross constriction in one spot only in the descending branch of the left coronary artery; these vessels were otherwise healthy. The subject was found dead in bed.

CASE 47.—One centimetre of the descending branch of the left coronary artery was extensively blocked. The coronary arteries were otherwise healthy.

CASE 55.—There was nearly complete occlusion of one small portion of the right coronary artery, and of the descending branch of the left coronary artery.

CASE 62.—There was fairly gross atheroma of a small part of the descending branch of the left coronary artery.

CASE 71.—For 2·5 centimetres of its descending branch the left coronary artery was grossly calcified, and a small segment of the transverse branch was calcified. The remainder of the coronary arteries appeared normal.

CASE 79.—For three to four millimetres the descending branch was grossly occluded. All other arteries were healthy. The subject, a man, aged thirty-two years, dropped dead at work.

CASE 80.—There was minor narrowing of the proximal centimetre of the descending branch of the left coronary artery. All other arteries were healthy. Death was due to pneumonia.

FURTHER NOTES ON IRUKANDJI STINGS.

By H. FLECKER,
Cairns, Queensland.

IN 1952 I described a very specific marine sting under the title of irukandji. The purpose of these notes is to emphasize that this is a distinct entity with quite characteristic clinical symptoms referred to by Southcott and Powys as type A. There appears to be some confusion with minor injuries, which Southcott and Powys class as type B stingings, probably produced by other coelenterate organisms of far less potency. Despite intensive search for the agent responsible, this has not yet been found.

In the light of further experience, the following modifications and additions are noted.

Geographical Range.

The limit has been extended about fifty miles to the south by reports of cases amongst bathers at Etty Bay, a popular seaside resort for the Innisfail region. There appear to have been reports from the Darwin area, from the Gulf of Carpentaria and even from Fiji.

Beach Conditions.

It is noted by beach frequenters that the casualties occur only when a strong northerly wind is blowing. Some meteorological and oceanographic records might assist in the solution of the problem.

Seasonal Influences.

The earliest record so far has been on November 30 at Etty Bay in the Innisfail district. Whilst hitherto no casualty has been noted later than February 6, during 1956 some stings have occurred in the region of Palm Cove up to a fortnight later.

Cause of Injury.

The cause of the injury is still very much of a mystery. The fact that numerous attempts to trace the offender have been unsuccessful suggests that the agent is very small. This is corroborated by the fact that a man, whilst swimming on his back with only a thin layer of water above, was nevertheless stung on the anterior aspect of his abdomen. An attempt is contemplated next summer to collect the plankton in the affected area with special nets and to endeavour to examine their contents. This may yield some positive results.

Local Effects.

The trivial appearance or even complete absence of local signs is characteristic, and the complete absence of weals, typical of Physalia and the stings which end fatally, is confirmed. It is believed that in the few odd cases in which slight wealing is noted it is not of the same nature as the irukandji sting, but may be produced by another medusa not yet identified.

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Reports of Cases.

HETEROTOPIC BONE FORMATION IN THE GALL-BLADDER.

BY EVA A. SHIPTON AND J. S. INDYK,
Sydney.

THE presence of heterotopic bone of the gall-bladder is sufficiently rare to merit publication of the following case.

Clinical Record.

Mrs. A., aged sixty-two years, referred by Dr. J. J. Lee, had been complaining of pain and discomfort in the right hypochondrium for more than thirty years. She had first

been told that she had a diseased gall-bladder thirty years ago, on X-ray evidence, and since then she had had colicky upper abdominal pain several times a year. The pain would pass through to her back. The worst attack was in January, when she vomited for a considerable time. She had never been jaundiced, but had noticed pale stools at times. Her appetite was very poor, and even the sight of food would make her nauseated. Cabbage, cauliflower, meat or fish would make her vomit.

Examination of the patient showed her to be an elderly woman with signs of recent weight loss. Tenderness was elicited over the gall-bladder area. An X-ray examination was carried out on March 12, 1954, by Dr. G. Hagarty, who reported as follows:

> No satisfactory shadow of the gall bladder is obtained indicating that it is non functional and pathological. A very large opacity is seen in the biliary area which may well be a gall stone, but of course when the gall bladder itself fails to fill, localisation is not possible.

The skiagram is shown in Figure I.

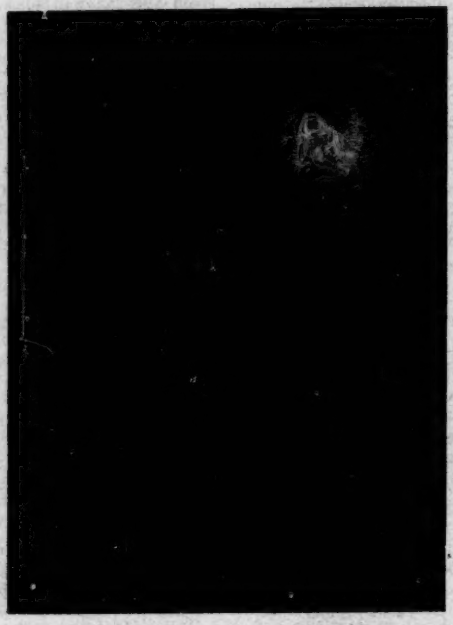

FIGURE I.

At operation on May 24, 1955, a right upper paramedian incision was made. The fundus of the gall-bladder was completely wrapped in omentum, and adhesions were present between the gall-bladder and the duodenum. When the omentum was freed from the gall-bladder there was a defect about half an inch in diameter in the gall-bladder, from which some inspissated bile and debris oozed out. The gall-bladder was removed without difficulty. It felt solid, as if filled by a very large stone, and it was not possible to grip the gall-bladder with forceps. The common bile duct was slightly dilated, but no stones were palpable in it and it was not explored. Numerous small stones were present in the gall-bladder. The patient developed a severe wound infection after operation, but it gradually resolved.

Pathological examination of the gall-bladder showed that the mucous membrane had entirely disappeared. The wall of the gall-bladder was the site of a pronounced foreign-body reaction, in which cholesterol clefts and foreign-body giant cells were conspicuous. Scattered throughout this were numerous fragments of cancellous bone, in the interstices of which fatty marrow showing hæmatopoiesis was present. Some bile pigment was also evident in the wall.

Discussion.

Heterotopic bone formation has been discussed in the literature from time to time, but no definite conclusion as to its cause has been reached. Some experiments have been carried out, the gall-bladder being transplanted into other tissues. Nakamoto (1927), while investigating the heterologous growth of the epithelium of the gall-bladder of guinea-pigs, transplanted the gall-bladder into the subcutaneous tissue of the abdomen and into the abdominal muscles, and in almost all cases in which the animals survived for fourteen days the formation of osseous tissue was observed. In two cases, besides the osseous tissue formation he observed the development of cartilage and marrow. Bauer and Hakki (1942), amongst others, undertook some experimental work in transplanting the gall-bladder, but the formation of bone was not observed.

Micseh (1933) reported on a necropsy on a patient who died from carcinoma of the gall-bladder with metastases in the liver, lungs and lymph nodes. Both the tumour and metastases contained true bone with hæmatopoietic bone marrow. The bone was situated close to the tumour cells in the connective tissue stroma.

Huggins and Sammett (1933) in a series of experiments presented evidence that the epithelium of the gall-bladder was capable of inducing bone formation in certain connective tissues such as the abdominal wall. The subepithelial connective tissues of the gall-bladder and urinary bladder did not share in this tissue reaction and resisted the bone stimulus of the epithelium. They concluded that there were two components in the tissue reaction that produced bone—(i) the epithelium and (ii) the type of connective tissue—and that there was a physiological difference between morphologically similar connective tissue cells manifesting itself in potency or impotency to form bone.

The osteogenic stimulus of the epithelium lining the urinary tract has been widely investigated. Sacerdotti and Frattin (1902) showed that ligation of the renal pedicle was followed by calcification and ossification in the necrotic kidney. Other workers repaired defects in the ureters of dogs with pedunculated flaps of fascia, and found that in every instance a layer of bone formed in the position bordering on the lumen, converting it into a rigid tube.

Defects in the bladders of dogs were repaired by transplanting *fascia lata*, and in every case the portion of the graft bordering on the lumen became ossified. Asami and Dock (1920) ligated both renal artery and vein of the rabbit's kidney, and found that bone formation began independently of calcification in the loose vascular connective tissue close under the transitional epithelium of the calyces. Phemister (1923) reported three cases of renal calculi attached to the kidney lining and composed partly of living bone.

Huggins (1936) studied the formation of bone in certain connective tissues in the dog and rabbit. The mucosa of the bladder formed a cyst, containing large amounts of calcium and phosphate secreted by the bladder mucosa, and bone was formed in the wall. He later found that phosphatase activity was relatively high in the tissues during the various stages of heterotopic bone formation, and that the fibroblasts of the subperitoneal coat of the urinary bladder were not capable of resisting the bone-forming stimulus of the epithelium of the bladder, but that the fibroblasts of the submucosa invariably resisted this stimulus.

Mixed tumours of the bladder containing bone are rare, but can easily be explained by the influence of the bladder mucosa on the stroma, causing metaplasia to bone.

Chauvin and Rouslacroix (1929) reported finding bone in laparotomy scars after operations on the bladder, and Copher (1938) found that transplants of urinary bladder epithelium caused bone to form if it was placed in a bony defect and effected union when otherwise union would not occur. This was not preceded by the formation of cartilage. They considered the possibility that the bladder epithelium might produce a ferment-like substance able to cause formation of bone.

Heterotopic bone has been found in many parts of the body, ovary, Fallopian tube and blood vessels. Hiebaum (1935) described its formation in the lung and trachea, and Keith (1927), in a complete discussion of the subject, described it in the tonsil and choroid coat of the eye.

In laparotomy scars the majority of ossified wounds have occurred in or near the mid-line of the abdominal wall, and Keith (1927) suggested that there was a morphological association between the formation of bone in that site and the fact that in certain reptilia rib-like structures occurred in this region.

There are several theories as to the cause of heterotopic bone formation. According to Weinman and Sicher (1947), true ectopic bone formation has been observed only in tissues which are the site of pathological changes, and all cases have one common factor—namely, the reactive proliferation of young connective tissue. The most common stimulus to bone formation is the presence of calcium. It is also considered that local supersaturation with lime salts in necrotic foci stimulates young fibroblasts to differentiate into bone corpuscles and deposit a bony matrix. However, some other factor must be present, as necrotic and inflammatory foci are common, whereas the formation of heterotopic bone is comparatively rare. Keith (1927) advocated the view that "new" osteoblasts arose from the capillary system, especially from buds thrown out when a neighbouring substance or body has to be absorbed. Scheidegger (1939) used the term angiogenic bone, since the bone tissue is formed in the immediate vicinity of blood vessels. Gruca (1925) suggests that there is a congenital diathesis of varying degree and divides cases of heterotopic bone into three groups. Individuals in the first group have the greatest tendency to bone formation and develop the progressive type of disease early in life. This is supported by the presence of other congenital anomalies in *myositis ossificans progressiva*. The second group inclines to form circumscribed bony masses after repeated slight injuries or inflammations, and the third group requires very severe trauma to produce bone. This theory would explain why *calcinosis universalis* is not accompanied by bone formation, and why calcified uterine myomata are common, but myomata with heterotopic bone are rare.

Modern theories of bone formation tend to show that bone salt deposition occurs selectively only in certain predisposed tissues, while other non-osteogenic tissues are bathed in intercellular fluid of the same composition.

It is not known what part specific cell activities involving enzymes play in the formation of heterotopic bone formation, nor whether certain vitamins or hormones are involved.

Although it is known that calcification of the gall-bladder can occur in long-standing inflammation, and that metaplasia of the gall-bladder epithelium to the squamous type is not uncommon, no other instance of heterotopic bone in the gall-bladder accompanied only by inflammatory changes has ever been reported.

Summary.

1. A case of heterotopic bone formation occurring in a gall-bladder is presented.

2. The theories of heterotopic bone formation are discussed, and the literature dealing with this subject is reviewed.

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PRIMARY CAECO-COLIC INTUSSUSCEPTION IN AN ADULT: A CASE REPORT.

By A. RUMORE,
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INTUSSUSCEPTION, though commonly found in the infant, is rare in the adult. When intussusception does occur in an adult, a cause is mostly obvious—for example, polypus, lipoma, inverted Meckel's diverticulum, a mass of lymph nodes at the ileo-caecal junction or previous gastro-enterostomy (Grey Turner, 1955; Maingot, 1955).

Donhauser and Kelly reviewed 665 cases of intussusception in adults reported in American and English literature between 1900 and 1947. Of these intussusceptions, 24% were classified as primary—that is, without discoverable cause. Of these primary types, ileo-ileal, ileo-caecal and ileo-colic formed 68%, colo-colic, appendico-colic and caeco-colic 19%, and other types 13%. It can be concluded, therefore, that primary caeco-colic intussusception in the adult is rare.

Clinical Record.

The patient was an Italian male fruit-shop assistant, aged twenty-two years. He presented with a history of severe diffuse colicky abdominal pain of three hours' duration. Its onset was sudden. He had no previous history of indigestion or abdominal pain. He had had no vomiting or diarrhœa, and the bowels had opened normally the previous night. There had been no dietetic or alcoholic indiscretion. He was a non-smoker. The patient had suffered from asthma, but had not had an attack for some years. There was nothing else relevant in his own or family history.

On examination, the patient was a short, pale young adult male with an anxious expression and in obvious abdominal pain. The temperature was 98° F., the pulse rate was 80 per minute and regular; respirations numbered 18 per minute. The tongue was furred. In the abdomen pronounced tenderness and guarding were present in the right hypochondrium. There was also some tenderness in the right iliac fossa. There was no tenderness on the left side of the abdomen. No abdominal masses were felt. The hernial orifices were normal. Examination *per rectum* revealed no abnormality. The bowel sounds were normal. There was no abdominal distension. There was no sugar, albumin or bile in the urine.

As the diagnosis was in doubt, laparotomy was decided upon. The abdomen was opened by a right lower para-

median incision. The caecum was found to be completely intussuscepted into the ascending colon almost as far as the hepatic flexure. Intussuscepted with the caecum were four inches of ileum and the appendix. The small bowel was not distended. The intussusception was readily reduced by pressure on its apex. On reduction of the intussusception, the caecum was found to be long and unusually mobile. It was also much congested and œdematous, but viable. It was apparent that the *caput caeci* formed the apex of the intussusception, and as this showed a pronounced tendency to reinversion, a caecopexy was performed. The appendix was much congested, and as its viability was in doubt it was removed. Careful search revealed no tumour or other abnormality in the large or small bowel. A Meckel's diverticulum was not present. The mesenteric lymph nodes and the lymph nodes at the ileo-caecal junction were only slightly enlarged.

Except for an attack of asthma immediately after the operation, recovery was uneventful.

X-ray examination by barium enema six weeks after the operation showed that the caecum was normal; the barium passed readily through the ileo-caecal valve into the ileum. No abnormality was demonstrated to account for the recent intussusception.

Discussion.

The mechanism of production of intussusception in the so-called primary cases is unknown. In children it is thought that primary intussusception may arise from irregular or perverted peristalsis due to enteritis, swollen Peyer's patches, bowel spasm, dietetic changes or allergic states. In the adult, conditions such as submucous lipoma, carcinoma, polypus, inverted Meckel's diverticulum, prior gastro-enterostomy and other rarer causes are mostly found to initiate intussusception.

Mesenteric lymph node enlargement and a mobile caecum, both of which were present in this patient, are considered among the rarer causes of intussusception. Lymph node enlargement was considered to be an ætiological factor in only one case of the 665 reviewed by Donhauser and Kelly. The lymph node enlargement in this patient was so slight and remote from the apex of the intussusception that this could not in any way be considered as a "mass" of lymph nodes in the sense described by other authors. In my opinion it is most unlikely that this degree of enlargement of lymphoid tissue was sufficient to initiate the intussusception in this patient. However, enteritis or lymphoid tissue enlargement within the bowel wall, though slight, may interfere with peristalsis or induce spasm or hyperirritability of the bowel wall sufficient to initiate intussusception. In some patients, particularly children, a definite relationship may be observed between tonsillitis, abdominal pain and mesenteric adenitis. Because of the difficulty in diagnosis, some of these children come to operation. Pronounced mesenteric adenitis may be found in association with single or multiple small ileo-ileal intussusceptions of the primary type, which are easily reducible and indeed seem capable of spontaneous reduction. Recurrent abdominal pain in children may at times be due to just this type of intussusception. In two adult patients operated on for recurrent abdominal pain I have observed this type of primary, easily reducible ileo-ileal intussusception.

Again, of the 665 cases reviewed by Donhauser and Kelly, in one the intussusception was attributed to a mobile caecum. It seems certain in the case reported here that the caecum was pendulous and unusually mobile; but this is found in many patients, and whilst it is readily seen how this condition can predispose to volvulus of the caecum, it is difficult to see why a mobile caecum, *per se*, should initiate a caeco-colic intussusception. Orloff (1956) suggests that a mobile caecum may predispose to an ileo-caecal intussusception by allowing an exaggeration of the normal projection of the ileo-caecal valve into the caecum as the intestinal contents are discharged from the ileum into the caecum.

Allergy is considered as an ætiological factor in intussusception in children. It is interesting to note that the present patient had suffered from asthma in years past, but had not had an attack for some years. There seems to be no causal relationship between the two conditions in this patient. In the series reviewed by Donhauser and Kelly not one case was attributed to allergy. Maingot (1955) states that the recurrence of acute intussusception is rare. Figures are quoted to show that the recurrence rate in children is 2%, and as a rule no operative measures are taken to prevent recurrence of the condition. However, caecopexy in this patient was considered necessary because of the tendency to inversion shown by the *caput caeci*. Maingot stresses that the minimum procedure necessary should be carried out at the first operation; the intussusception should be reduced, and the causative lesions, such as tumour, Meckel's diverticulum or the appendix, should be removed at a second operation unless complications make their removal imperative.

According to Fitzwilliam (quoted by Maingot, 1955) the so-called *caput caeci* intussusception is merely an ordinary ileo-caecal invagination which has carried before it the loose outer wall of the caecum. However, in this case there appeared to be no doubt that the *caput caeci* formed the apex of the intussusception and that the ileo-caecal valve was drawn up into the ascending colon by the invaginated caecum. On reduction of the intussusception, a distance of four inches was found to exist between the *caput caeci* and the ileo-caecal valve.

Diagnosis of intussusception in the adult is most difficult because of the variable and indefinite symptomatology, in contrast with the well-recognized symptomatology and findings in children. Early operation is imperative, as at this stage the reduction is simple and the mortality rate is very low, compared with the high rate in misdiagnosed or neglected cases in which more complicated surgical procedures are required.

Summary.

A case of acute caeco-colic intussusception occurring in a young male adult is described.

In this case, as none of the recognized causes of adult intussusception was found, the condition is regarded as an example of the rare primary form.

It is considered that enlargement of lymphoid tissue within the bowel wall may be an ætiological factor.

Clinical diagnosis from other abdominal emergencies is not usually possible before operation.

In this case a good result followed reduction of the intussusception and caecopexy.

Acknowledgement.

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THE PROGRESS OF A GREAT LIBRARY.

THE recent announcement of the creation of the National Library of Medicine of the United States of America (see M. J. AUSTRALIA, November 3, 1956, page 689) opens a new chapter in the history of a great medical library. It is appropriate therefore at this stage to review its past and to consider its present significance. The facts have been set out in detail and with devotion by the present director of the library, Lieutenant-Colonel Frank B. Rogers,[1] in a series of papers on which we are glad to be able to draw freely. The story goes back to 1836, when a few books on an army surgeon's shelf marked the beginning of the Library of the Surgeon-General's Office, United States Army. A catalogue produced four years later listed 228 volumes. It was not, however, until 1865 that the library received the great impetus to which it owes so much. In that year the famous John Shaw Billings was appointed librarian and had placed at his disposal a large sum of money remaining from Civil War hospital funds. Billings was one of those rare spirits who achieve in a lifetime far more than an ordinary man would dream possible, and, as Rogers writes, he brought with him to the task of librarian enthusiasm, tremendous ability and high purpose. With tireless energy and determination he began to amass books, theses, reports, transactions and periodicals pertinent to medicine from all places and of all times. The collection which had numbered but 2000 titles when he arrived grew to over 300,000 titles by the time he left thirty years later. He had, in fact, accumulated for the library the world's greatest collection of medical literature and given it a primacy which it has never lost. Rogers points out that a large part of Billings's fame and the library's international reputation is based on bibliographical publications which Billings created. In 1879 Billings, with his colleague Robert Fletcher, began the publication of a monthly periodical index, the *Index Medicus*, and in 1880 there appeared the first volume of the "Index Catalogue of the Library of the Surgeon General's Office, U.S. Army", a combined catalogue of monographs and indexed periodical articles, authors and subjects in one alphabet—a key to a collection so vast that it is still thought of as the bibliography of medicine and not of a particular library only.

With the passing years the library continued to grow. A new building was constructed for it in 1887, but as early as 1900 it was noted that the library was "in urgent need of shelving for its additions, some of which are now being stored on window sills or on the floor". The situation became increasingly serious, especially as poor building maintenance was not even sufficient to keep out the rain and coal soot from the nearby railroad. Indeed, the building, which is still occupied today, has never had some of these serious defects remedied, although the removal of the medical museum has made a large amount of extra space available for the library. The rate of acquirement of books and other literature has fluctuated. After the first World War the influx of material from the war areas, delayed for years, became particularly heavy. However, in the late twenties and particularly during the depression years of the thirties the library was starved financially; in one period of two years only sixteen books were purchased, and in the course of a single year the acquisition of journals fell off by more than 20%. The outbreak of the second World War brought increased demands on the library which it was hard put to meet, but a fortunate corollary was a survey of the library, with consequent recommendations which are gradually being put into effect. Great improvements have been effected in staff and organization. By the end of the war the book budget had been almost trebled, a binding programme for rehabilitation of the collection had been instituted, a modern reference service had been established, and basic plans for recataloguing and reclassifying the collection had been laid and were to get under way shortly. Three major problems remained: space, continuity of management, and the indexing and publishing of backlogs. The urgency of these problems is well seen when we realize that in 1955 the library contained about 900,000 items (monographs, journal volumes, theses, pamphlets) and was providing the Department of Defence and the nation at large with the world literature of medicine. It had fine long runs of periodicals, a growing collection of portraits of medical men and pictures of hospitals, and a probably unique section of American and foreign government and statistical documents. Over 8000 serial titles were received by purchase, gift and exchange, including about 4500 journals, and the yearly acquirement of journal and monographic pieces had risen to about 100,000, representing literature of medicine, dentistry, pharmacy and allied sciences in all languages and of all times. In addition,

[1] *Mil. Surgeon*, April, 1953; *Libri, International Library Review*, Volume 3, 1954; *J. Med. Education*, September, 1955.

a section on the history of medicine had been built up which could at least stand without shame in the company of any other similar collection in the world. An extensive art collection consisted mainly of prints, programmes, posters, caricatures, book plates and the like all related to medicine or the allied sciences. The development indicated by these figures and facts goes on with ever-increasing speed so that every year one mile of shelf space must be available to accommodate new acquisitions. The problem of space has been increased by a growth in the number of the staff, and various expedients have been adopted to overcome it, including the use of nearby temporary buildings in Washington and the housing of the history of medicine section in Cleveland, Ohio. However, relief is in sight, as plans are now under way for a new building which should be ready in from three to five years and which has been planned to cope with the requirements of the next fifty years at the present rate of intake.

The problem of continuity of management appears to have been largely overcome at present. In the last few years the Armed Forces Medical Library, as it has been called, has been managed by a military officer in the position of director with a civilian chief librarian as his executive officer. Indeed the director has been the only military officer on the staff of the library and so was the only member of the staff not included in the transfer to the National Library of Medicine, the constituting Act referring only to the transfer of civilian personnel. No doubt special provision will be made for the director, who is, of course, the key man in the whole move.

The third problem, that of backlogs in indexing and publishing, is a difficult one, to which we can do no more than make passing reference. It is sufficient to say that the number of references in the files of the "Index Catalogue" are quite unmanageable, and Billings's great concept, appropriate enough to his own day with its limited medical literature, has now been abandoned. However, the attitude of the library to this position has been essentially constructive, and out of it has grown the *Current List of Medical Literature*, a monthly publication with author and subject indexes, in which the contents of some 1500 of the most important medical journals of the world are listed. In addition, the *Armed Forces Medical Library Catalogue*, an annual publication, provides a record of books received at the library during the year. It has two sections, authors and subjects, and contains entries for monographs, serials, theses, documents and pamphlets. Between these two publications a comprehensive cover of the world's medical literature is maintained. Another valuable activity of the library is the publication of occasional bibliographies of a more comprehensive nature on subjects of more than average current interest. The topics of these bibliographies have included burns, plasma substitutes, military psychiatry, bone physiology and the chemotherapy of cancer. The latest publication, "Bibliography of Medical Reviews", brings together a list of review articles on a variety of subjects. The other services of the library are the sort of thing that one would expect, carried out to a standard that is well above average. They include the lending of most types of medical literature to local medical libraries, a photoduplication service and bibliographic research work for suitable people.

No doubt the transfer of this library from the control of the armed services brought a certain amount of heart-burning after one hundred and twenty years during which it has been successively the Library of the Surgeon-General's Office, United States Army, the Army Medical Library and, for a short period, the Armed Forces Medical Library. Nevertheless its new status is appropriate and places it in its right place alongside the other two great libraries of the United States, the Library of Congress and the Library of the Department of Agriculture. Indeed, it is scarcely an exaggeration to say that the title of National Library of Medicine is inadequate, because it is indeed an international library. The comprehensive, practically exhaustive, nature of its stock makes it the great standby, not only for the other medical libraries of the United States, but even for major medical libraries in other countries. Lieutenant-Colonel Rogers has described the prospect before the library as being at least as bright as its achievements are in retrospect, and adds this comment:

> Just seventy years ago, speaking of the urgency of the task of medical bibliography, Billings said that "There are not two springs in the year, nor in the life of the nation, and if the spring work is not done in time the fruits of summer and autumn will be correspondingly deficient". It may be that spring time is over, but it is not yet autumn. The officers and staff of the Library look forward to a long summer of cultivating and growth.

Of this tree of knowledge so faithfully tended it may well be said that its ripe summer fruits are a refreshment to mankind, and its leaves are indeed for the healing of the nations.

The history of this great American library makes a strong appeal to the imagination. It should do more than that. Those who control libraries must know that in their activities there can be no standing still. A well-equipped and properly run library must have enough room to expand. Denied this room, it will become so choked that its usefulness will disappear. Medical libraries in this country will not need a mile of shelving a year, but they will need a great deal. Not only this—they will need additions to staff, and in this matter training is necessary. It would be the height of folly to leave any section in the care of a lass (it is sure to be a woman) who has had no library experience, were she ever so full of good intent. Of vital importance, too, is the fact that medical practitioners are becoming more and more conscious of the value of a good library and turn to it in increasing numbers. This is a matter which should be regarded as of the greatest importance by the Councils of some of the Australian Branches.

Current Comment.

THE TRAINING OF BACKWARD CHILDREN.

In the issue of this journal of December 22, 1956, there appeared an account by A. G. Cumpston of work that had been done in Canberra in the management of subnormal children. The initiative was taken by a group of interested parents, who formed a special school for children aged between eight and thirteen years, with intelligence quotients below 55. Cumpston's paper was read at a meeting of the Australasian Association of Psychiatrists in October, 1955, and he confined his comments to the

observations which he and D. C. Henchman had made as an honorary medical panel. The most pressing problems are those of finding affected children, and securing early education of them and of their parents. Long before anything resembling formal education can be considered a backward child needs to be helped to form good toilet habits, to feed and dress himself, to develop language and speech and so on. On the other hand, the parents need help in deciding the amount and type of discipline, and in establishing towards the child an attitude that will be one neither of rejection nor of over-indulgence. The great difficulty is in the early recognition of backwardness, without which the opportunity of helping the child is likely to be missed for all time, so that he progresses through a childhood of complete frustration for himself and the rest of his family to the age of sixteen years, when he becomes eligible for an invalid pension. Point is lent to Cumpston's comments by a report of a case by D. C. Henchman, published in the same issue of the journal; the boy who formed the subject of the report had not been recognized as backward until he was beyond help, and although he was of the right age and the right intelligence quotient to be admitted to the special school, after a trial he was found so uncontrollable that he had to be sent home. It is easy to realize what his future will be. Cumpston stresses what could be accomplished if there was even one clinic in Sydney with a team of specialists and ancillary services; reference to such a clinic would at least establish an accurate diagnosis, increase the parents' confidence and capacity to cope with the problem, and provide a programme of physical and educational treatment for the general practitioner, teacher, social worker and interested parent organizations. In another paper read at the same meeting as those of Cumpston and Henchman, E. M. Wann, of the Mental Hospital, Kew, Victoria, from experience with the training of subnormal children in that institution, lends support to what the previous authors said. Wann's paper is a valuable account of the way in which the practical problems are approached.

The problem is world wide, since the proportion of subnormal children may be anything from 1·2 to 1·3 per 1000 of population in English-speaking countries. (This applies to children with intelligence quotients of 25 to 50.) J. G. Hall, Ruth E. Francey and M. L. Girvin[1] have reported the results of an experiment carried out in Toronto, Canada, which terminated in June, 1954. Hall and his co-workers dislike the negative implications of the terms in general use to describe affected children, and use the term "ineducable-trainable". The Department of Public Health of Toronto, with financial assistance from the Federal Health Grants, started a Training Unit for Mentally Retarded Children, not with the idea of filling a need in the community, but for the purpose of studying the problem of the ineducable child. Among the questions to be answered were the following: (i) whether the pressure on institutions could be relieved by a programme in the community; (ii) what form this programme might or should take; (iii) what response the ineducable child might make to a training programme; (iv) what type of training was necessary; (v) what the cost of such a programme would be. The unit was established in the Sunday school rooms of a church; the staff consisted of three instructors, all trained teachers with previous experience with retarded children, but not in a similar setting; there was a full-time psychologist. The services of a public health psychiatrist and a public health nurse were provided without charge. The janitor later supervised some of the boys in simple wood carving. The age limit was from six to twelve years, and children with severe physical disability were not accepted. The intelligence quotient had to be between 40 and 50, and the number of children was set at 30, so that there were 10 children to an instructor. There were 19 boys and 11 girls; 10 of the children had a mean intelligence quotient of less than 40, and nine were mongoloid.

The detailed description of the work of the unit and what it was able to do for individual children is of great interest, but not relevant to the present discussion. What is important is the general sociological and financial aspect of such a programme. It proved an expensive undertaking; the cost was $650 to $700 per pupil per year—and this covered two and a half hours per day for five days per week, with somewhat shorter holidays than the ordinary schools. Transport and rent accounted for a large proportion of the cost. Hall and his associates are certain that the cost could be considerably reduced under favourable circumstances. The total number of children who attended the unit was 44 (some changed their residence, others left on reaching the age of twelve years). Two children with intelligence quotients in the region of 30 were taken on trial, but were found too much of a disturbing element; two others with about the same level of intelligence made a satisfactory adjustment. During the life of the unit three children were transferred to opportunity classes in public schools and made satisfactory adjustments there. A mongoloid child with an intelligence quotient of about 50, and reading well at the grade I level, could not be retained in an opportunity class because of disturbed behaviour there. When the unit was closed, four other children, including one mongoloid child, were accepted into opportunity classes and have adjusted themselves well. Thus seven of the 44 children were able to attend ordinary schools. Seven children had to be admitted to the Ontario Hospital Training School when the unit was closed; the counselling service of the unit helped the parents to accept the move. The authors point out that they cannot estimate how many of the children would have had to be admitted to that training school if the unit had not come into operation, but they are certain that many of the pressures that would have made it necessary to consider such a step were relieved. The majority of the remaining 30 children were without difficulty absorbed in the schools operated by the Parents' Council for Retarded Children. Psychological tests carried out at the time when the children left the unit showed a distinct "general but not too significant" improvement in the results in comparison with previous tests. The improvement was related to improved emotional adjustment and improved behaviour. The results were of significance mainly when they showed that the intelligence quotient had improved to above 50, which made it possible to recommend that the children should be admitted to ordinary schools. A much more significant change was found in the results of the Vineland Social Maturity Scale, which was applied to the children on their admission to the unit and when they left; there was generally a pronounced improvement consistent with the child's improved behaviour and emotional adjustment. It was found that the younger children responded most quickly to the training with improvement in behaviour; this suggested that many of the problems that they had presented in the unit might have been avoided by starting school-like training at an earlier age. There were many gains to the children that could not be measured—increased ability to get on with other children and in the family circle, better behaviour in public vehicles and in church (they attended a short service in the chapel once a week), and the ability to occupy themselves alone, instead of requiring the mother's attention all the time in the home. In short, there was a general easing of the situation all round, and the children were much happier through the development of even elementary skills. Speech training was particularly successful; at the end almost all the children could be understood fairly well.

Cumpston in his paper quoted a statement from the World Health Organization Technical Report number 75 on "The Mentally Subnormal Child", as follows:

> Every child has the right to develop his potentialities to the maximum. This implies that all children, irrespective of whether or not they suffer from mental or physical handicap, should have ready access to the best medical diagnosis and treatment, allied therapeutic services, nursing and social services, education, vocational preparation and employment. They should be able to satisfy fully the needs of their own personality and become, as far as possible, independent and useful members of the community.

[1] *Canadian J. Pub. Health*, September, 1956.

At the time when Cumpston's paper was read, the school instituted by the Canberra parents had been successfully functioning for six months. This fact, and the Canadian experiment just discussed, show that much can be accomplished in the management of these children if they are recognized early enough. Certainly the cost of their training is high; but is it so high as the cost in family misery, in undeveloped potentialities, in the need for institutional care that will be unavoidable in a large majority of cases? It is noteworthy that in both these reports the part of the parents is emphasized. Interested parents provided the motivating force in the Canberra work. Here is a lesson worthy to be kept in mind; force is lent to it by what has been accomplished at the Spastic Centre in New South Wales.

RADIOACTIVE ISOTOPES.

MOST medical practitioners will naturally tend to think of radioactive isotopes in terms of their medical uses, and it may come as a surprise to some to know that they have a wide application in industry as well as in scientific investigation, and in agriculture and food production. To assist Australian industries, science and agriculture to obtain the maximum benefits from the various applications of radioisotopes, an isotopes section has been established within the Australian Atomic Energy Commission, and the Commission has published an illustrated booklet prepared by J. N. Gregory, the head of the Isotopes Section, with the title "The Industrial and Scientific Applications of Radioactive Isotopes with Particular Reference to Their Value to Australia". This is a comprehensive, though not, of course, exhaustive, review of the applications of isotopes and is available to industrial and scientific workers on application to the officer-in-charge of the section at Box 5343, G.P.O., Sydney. According to Gregory, the most extensive use of radioisotopes outside the medical field has been in industrial γ radiography, in the examination of steel, alloys, weldings and so on. Another use has been in the measurement of the thickness of processed materials. A wide range of β and γ energies enables thicknesses from a few thousandths of an inch up to inches of steel to be measured accurately. This has wide application in the production of various sheet materials, in the control of ink thickness during the lithographic printing process, in the measurement of corrosion in oil refinery and chemical plant pipe lines and reaction vessels while they are still in service, and even in determination of the depths of snow and the amount of water in the snow layer in catchment areas. Isotopes are also used to trace the flow of materials in various industrial processes, to detect leaks in water mains, to test ventilation, to estimate mixing efficiency, to trace silt movement and so on. In the agricultural field, improvement in crops has resulted from the introduction of beneficial mutations induced by radiation, and tracer studies have been used in a variety of ways to investigate the problems of agriculture. A primary object in the establishment of the isotopes section within the Australian Atomic Energy Commission is to provide an up-to-date information and advisory service to users and potential users of isotopes. Advice is given on where and how radioisotopes can provide material advantages to industry, and on the availability and supply of isotopes and equipment. Later it is intended to provide scientific and technical assistance in installation and testing of equipment. A bibliography service also is being organized. For research workers, advice is available on the techniques of using isotopes and equipment, the design and setting up of radiochemical laboratories, and isotope supply.

At present, all isotopes supplied in Australia are obtained from abroad. Because of the delay in transport, even by air, many isotopes which decay very rapidly are not available here. These short-lived isotopes are much in demand abroad for scientific, medical and industrial uses, and when the high flux research reactor, now being built for the Australian Atomic Energy Commission at Lucas Heights, near Sydney, is functioning, it will be able to supply all of them for local use. Special reactor radiation services will also be available to scientific workers, including facilities for radioactivation analysis. If there is sufficient demand, the isotopes section will be prepared to supply high level γ radiation sources of cobalt 60 (of the order of 1000 curies) for medical therapy and technological irradiation. Such high level sources are in very heavy demand in the United States and the United Kingdom, and there appears little hope of obtaining many of them from abroad. However, with the exception of cobalt 60, Gregory states that it is likely that for some considerable time it will be more economical for Australia to purchase from abroad the longer-lived isotopes used for medical and other purposes. Particularly important from the medical point of view is the supply of short-lived phosphorus and iodine radioisotopes. Many of the difficulties involved in their importation and distribution have been minimized by careful organization on the part of the Commonwealth X-Ray and Radium Laboratory, which is the agency primarily responsible for radioisotopes for medical use. Nevertheless, supplies are intermittent and lack flexibility owing to the time lag between the demand and the supply. Gold 198 and yttrium 90, which are used extensively overseas for the treatment of cancer, are not yet available in Australia on a regular supply basis because of their very short half-life (2·7 days). For the sake of economy and convenience it will probably be desirable to manufacture Australian requirements of these short-lived isotopes in the Australian reactor.

To stimulate the use of isotopes in Australian industry, the Australian Atomic Energy Commission has arranged an exhibition to show the place of isotopes in industry. It will be held on the fourth floor, Maritime Services Board, Circular Quay, Sydney, from Tuesday, January 29, to Saturday, February 2, inclusive. It will be open daily from 11 a.m. to 9.30 p.m., and admission will be free. Exhibits will be shown by the United Kingdom Atomic Energy Authority, by the United States Atomic Energy Commission, by Atomic Energy of Canada, Limited, by the Australian Atomic Energy Commission, by the University of Melbourne, and by the New South Wales University of Technology. In addition many overseas and Australian companies will have displays to show the equipment and assistance they can provide to help develop the use of isotopes in Australian industry. This exhibition and the work of the new isotopes section of the Australian Atomic Energy Commission will be of interest to medical practitioners generally. At the same time it should be borne in mind that they are concerned essentially with the use of radioisotopes other than in the medical field; the responsibility for the latter remains with the Commonwealth X-Ray and Radium Laboratory in Melbourne.

HYPOTHERMIA IN EXPERIMENTAL PERITONITIS.

HYPOTHERMIA as an adjunct to anæsthesia has now passed beyond the experimental stages, and its use is accepted as routine practice in certain surgical procedures. It was to be expected that the field of its application would be widened by experimental investigation, and indeed this has been going on for some years. In 1955 some work was done on the influence of hypothermia on experimental peritonitis by H. H. Balch, H. E. Noyes, C. W. Hughes, W. Blalock and E. Thibodeau.[1] These workers used white rats, and induced peritonitis by incising the caecum at laparotomy and expressing the fæces into the peritoneal cavity. The caecal wound was left open, and after suture of the abdominal wall mucin was injected intraperitoneally, on the grounds that it might interfere with phagocytosis. Hypothermia was induced by the administration of pentobarbital sodium and cooling of the animals to 25° C. The

[1] *Surgery*, December, 1955.

mean survival time of the hypothermic rats with acute peritonitis was increased to 11·4 hours, as compared with 8·6 hours for uncooled rats. The mean survival time of both cooled and uncooled rats was increased to sixteen hours by the intraperitoneal administration of dihydrostreptomycin; the deduction is that if the antibiotic was used, cooling was of no value. The cooling did not interfere with the efficiency of dihydrostreptomycin.

B. Eiseman, W. G. Malette, R. S. Wotkyns, W. B. Summers and J. L. Tong[1] have investigated the effect of hypothermia in experimental pneumococcal peritonitis. They used white mice, which they inoculated intraperitoneally with a culture of type III pneumococcus. The number of animals used was 329; 160 were kept in a hypothermic state for twenty-four hours, 130 served as normothermic controls, and 39 were anæsthetized in the same manner as the hypothermic group, but were not cooled. Two hours after the inoculation, the animals in the experimental group were anæsthetized with "Nembutal", and thirty minutes later, when they were unconscious, they were placed on a metal pan in the cold room at 4° C. for six to eight minutes. They were then placed in a constant temperature box adjusted to 19·5° C., their temperatures being automatically recorded every ten minutes. Additional anæsthetic agent was given as required to maintain narcosis. Twenty-four hours after the induction of hypothermia, the animals were placed in glass jars at room temperature and allowed to warm spontaneously. In one to four hours they awoke and ran about their cages, and the temperatures returned to normal. There were no long-term survivals among the test animals, since the dose of pneumococci was adjusted to cause death within four days. All the control animals that died during the first twenty-four hours after inoculation, and all the hypothermic animals that died during the first forty-eight hours, were submitted to autopsy to ascertain the cause of death. All the accidental and anæsthetic deaths occurred amongst the hypothermic group; the survival of these animals was statistically considerably increased in relation to the controls, and the increase was greater than could be accounted for merely on the basis of inhibition of bacterial growth during the period of hypothermia. It is thought that under the conditions of the experiments bacterial multiplication was inhibited at a greater rate than was the diminution of the immunological response of the host. Eiseman and his colleagues point out that in their study they were not able to determine the absolute nature of the degree of alteration in the immunological response of the hypothermic animals, since only the combined effect of infection and host resistance was measured. They have undertaken further studies, in which they propose to analyse the effect of hypothermia on the host resistance factors, such as the phagocytic index. Obviously the clinical implications of this work are far-reaching; but much more investigation is required before hypothermia can be applied to the treatment of infections in man.

THE SHOEMAKER'S WIFE.

As long ago as 1546, John Heywood asked the question: "Who is worse shod than the shoemaker's wife?".[2] The shoemaker's wife is by no means alone in being the last person to receive professional attention from her husband, and the doctor's wife all too frequently shares the same fate. Of course, it will be readily conceded that this seeming indifference is more pardonable in the doctor than in the shoemaker; the doctor's mind is inevitably bulging to the point of disintegration with weighty problems, from which he must not allow his attention to be deflected. No doubt these and similar thoughts prompted "E.C.S.", a doctor's wife, to write a short semi-clinical history of herself afflicted by a boil in the ear.[3] It seems that she suffers occasionally from these "most painful little devils in creation" (her words). She awoke one morning with the familiar prickling sensation in the right ear, and at breakfast told "the Boss" about it; he, unfortunately, at that very moment felt it his duty to go and water the chrysanthemums, and advised her to put some drops in the ear. She, following him, somewhat pathetically asked him whether he could remember to bring an injection of penicillin from the hospital; "his reply was mumbled to the chrysanthemums". From then on the proceedings took on the nature of a Pete Smith Specialty, "E.C.S." taking the part of Dave O'Brien. She tried to make beds; the pain and the noise in her ear were spectacular. Wearily she decided to take "the Boss's" advice, and went in search of the ear drops—one of his favourite remedies, thick, black, evil-smelling and requiring to be heated before use. The juggling required to heat the remaining contents of the almost empty bottle was equalled only by the contortions of the unfortunate patient as she tried to maintain her balance while standing on a stool before the bathroom mirror, lean to the left, and pour the horrid mixture into her ear. The inevitable happened, she gave a lurch, and the whole of the thick, hot, black mess poured out of the bottle, hit her on the temple and ran rapidly down her jaw, blackening every piece of her clothing with which it came in contact. In increasing agony she performed the necessary mopping-up operations and retired to bed with a dose of aspirin. The *finale* deserves to be quoted:

> When the Boss came home I was still in bed. "How are you feeling?" he asked. "Well, it is a little less painful—but I am now as deaf as a post." He gave a satisfied nod. "Good—it has burst."
>
> And as he turned to leave the room I heard him murmur: "Time—the Great Healer!"

Any further comment would be an anti-climax.

[1] *J. Clin. Investigation*, September, 1956.
[2] "A Dialogue on English Proverbs."
[3] *Central African J. Med.*, October, 1956.

COMBINATIONS OF ANTIMICROBIAL AGENTS AGAINST MICROCOCCUS PYOGENES.

THE in-vitro activity of various combinations of antimicrobial agents against *Micrococcus pyogenes* has been described by Burton A. Waisbren.[1] The investigation was made in an attempt to evaluate the effect of such combination of antibiotics, because there are increasing clinical opinions that severe fulminating types of infection and some types of chronic and recurring infections almost invariably are not influenced by treatment by a single antibiotic. Clinical observations of effective combinations were first tested, and ten different strains of *M. pyogenes* were included in the series of experiments, which were carried out by tube dilution methods. The results were classified into three groups: (i) no effect, if it was found that the end point of the more effective one remained unaltered; (ii) additive, when the concentration of the mixture was equal to that of the two used alone; (iii) potentiating, when the effective concentration of the mixture was less than when either agent was used alone. The antibiotics used were penicillin, chlortetracycline, oxytetracycline, chloramphenicol, streptomycin, bacitracin, erythromycin, nitrofurantin and tetracycline. Of 116 determinations made, an additive effect was shown in 49 instances, potentiation in 20, and inhibition in only seven instances. The advantage in combination, theoretically to be expected from combining a bacteriostatic with a bactericidal drug, did not prove constantly true. Waisbren did not think from these experiences that routine use of combinations of antibiotics was justified, except in such instances as enterococcus endocarditis, when a combination of chlortetracycline and erythromycin is of value, or Proteus infections, for which a combination of penicillin and chloramphenicol is used. The studies reported do not suggest that any one combination of antibiotics had great superiority over the others.

[1] *J. Lab. & Clin. Med.*, October, 1955.

Abstracts from Medical Literature.

PÆDIATRICS.

Perinatal Infection and Perinatal Death.

J. A. McCREDIE SMITH, R. F. JENNISON AND F. A. LANGLEY (*Lancet*, November 3, 1956) present a study of the clinical aspects of perinatal infection and perinatal death. Their experience suggests to them that infection plays a considerable part in the causation of perinatal mortality and morbidity. As a result of a controlled clinical investigation they conclude that the best single criterion of potential fœtal infection is probably maternal pyrexia. The prognosis for the infant is relatively worse if the pyrexia lasts more than forty-eight hours and is associated with fœtal tachycardia maintained for at least ten minutes. On the question of whether intrapartum pyrexia implies maternal and even fœtal infection, or whether it is possible for it to occur as a result of increased metabolic processes, the authors infer from the evidence that infection plays an important role in causing intrapartum pyrexia, but it does not exclude metabolic factors from playing a part. They explain the mechanism of fœtal infection in the following way. Bacteria commonly found in the vagina, or introduced by the attendant, enter the uterus by the cervical canal and infect the decidua. In some cases, infection spreads to the placenta or membranes or both. It may go no further, but may spread to the fœtus by the fœtal blood stream or by aspiration of infected liquor. The effect of perinatal infection is usually relatively slight on the mother, but can be disastrous for the infant, because organisms of relatively low virulence for the mother have a much greater effect on the infant, who has little or no immunity. Bacteriological studies suggest that antibiotic therapy reduces the incidence of potential pathogens. It may eliminate some or even all of the organisms in the vagina, so that infection of the fœtus is prevented; or, if the infection is established in the fœtus, it may control it and facilitate recovery. The treatment of patients suffering from intrapartum infection with combined streptomycin and oxytetracycline therapy seems to reduce perinatal deaths by preventing infection of the fœtus. This reduction in deaths can be shown to be significant only if it has been possible to treat the mother for at least forty-eight hours before delivery.

Blood Replacement in Thoracic Surgery for Children.

R. M. SMITH (*J.A.M.A.*, July 21, 1956) states that the replacement of blood lost during thoracic surgery in children must be effected with all the precautions that are observed in adults. But in addition it is imperative that the amounts lost and replaced be measured with exactness. The amount of blood lost can be followed by actually weighing the sponges used. It is also possible to estimate the amounts taken up by gowns and drapes. Replacement can be followed by using a burette calibrated to amounts of 5 or 10 millilitres rather than 25 or 50 millilitres, and by using a 10 millilitre syringe with three-way stopcock to pump the replacement fluid when needed. The replacement should be at least 10% to 15% ahead of the measured loss in volume. The anæsthetist and/or surgeon is guided not only by the "in and out balance" but also by the blood pressure, colour and other important clinical signs in the patient. Proper choice of replacement fluid is essential if hæmoconcentration, citrate intoxication, hypercalcæmia and similar complications are to be avoided. The author quotes quantitative data from a number of thoracic operations in children to illustrate the application of these principles.

Staphylococcal Pneumonia in Infants.

M. E. RISNEY, J. WOLFF AND B. S. B. WOOD (*Lancet*, May 26, 1956) describe a series of 35 infants suffering from staphylococcal pneumonia. They point out that in the past there has always been difficulty in making a reliable bacteriological diagnosis of this condition, unless empyema developed. Swabbings from the upper respiratory tract are unreliable because of the high carrier rate of staphylococci in this region. The importance of early identification of an organism is becoming greater because of the increasing development of antibiotic resistance in staphylococci. In 25 cases, therefore, a diagnostic thoracic puncture was carried out on infants. In eight of these some pus, sometimes only a very small amount, was obtained from the pleural space, and in all cases a staphylococcus was grown on culture. When no pus was found in the pleural space, the needle, of 16 or 18 gauge, was advanced into the lung. In 14 of the 17 cases in which this was done, a staphylococcus was obtained on culture at the first attempt. The authors considered that no ill effects resulted from the use of thoracic puncture. In nearly half the cases in which infants recovered, the illness ran a relapsing course, which indicates the necessity for prolonged antibiotic therapy.

Subcutaneous Administration of Chelating Agent in Lead Poisoning.

N. V. O'DONOHOE (*Arch. Dis. Childhood*, August, 1956) describes the treatment of two children suffering from lead poisoning. He states that it has become standard practice to treat lead poisoning by the intravenous infusion of calcium disodium E.D.T.A. ("Versenate"). This belongs to a group of substances called chelating agents, which are capable of combining with certain metals to form stable ring structures, water-soluble and readily excreted. Lead has a stronger affinity for E.D.T.A. than has calcium, and so the lead displaces the calcium and is excreted. Treatment has usually been by the repeated intravenous injection of the drug in dilute solution at six-hourly intervals. Lead poisoning in children is almost entirely confined to the younger age group, and in a plump toddler the difficulty of giving repeated intravenous infusions without cutting down on veins may be great. The author therefore gave the drug by subcutaneous injection to two infants. The drug was given in a 1% solution in normal saline, of which 25 millilitres were given each six hours for five days, making a total dose of five grammes. It is recommended that the dose should not exceed 0·5 gramme per 30 pounds per hour (given intravenously), one gramme per 30 pounds per day or five grammes per 30 pounds per week. Total treatment usually consists of one such course followed by another after a week's rest. The author gave the drug by slow subcutaneous injection from a syringe, taking about thirty minutes to inject the 25 millilitres and including 1500 international units of hyaluronidase in each injection. The results were good. In the first child rapid relief of symptoms and marked increase in the rate of excretion of lead occurred. In the second the response was satisfactory though less strikingly rapid.

Neuroblastoma in Childhood.

C. E. KOOP, W. B. KIESEWETTER AND R. C. HORN (*Pediatrics*, November, 1955) record their experiences with 45 children suffering from neuroblastoma. They have been impressed by the survival of such children in spite of management contrary to the usual principles of cancer surgery. In neuroblastoma, the occurrence of spontaneous change from a malignant to a benign form, necrosis of the tumour after simple biopsy, and survival after irradiation even in the presence of local metastasis, have been noted by various observers. In their series 35 of the tumours were found retroperitoneally, four in the neck and two in the spinal cord. All 19 of the patients free of metastases at the time of operation have survived. No patients with metastases in either bone or lung survived, though metastases in liver, lymph nodes or bone marrow did not necessarily indicate a fatal outcome. Of the 19 survivors, only 15 have been observed for sixteen months or longer following operation. No patients surviving for fourteen months without X-ray therapy have died later, with one exception. In the 41 patients reviewed, fourteen or more months after operation the survival rate has been 36·6%. Of the 15 survivors, only four received X rays in therapeutic dosage. Of these survivors 49% had gross evidence of metastases at the time of operation. The authors note a correlation between survival of patients and a "gross surgical insult" to the tumour. By this they imply an endeavour to remove the whole tumour, or a large portion of it. Where, instead of merely carrying out a biopsy, an endeavour was made to extirpate as much tumour as possible at operation, even in the presence of metastases, the survival rate was 63% (12 of 19 patients). In 22 patients in whom biopsy alone was carried out the mortality rate was 87%.

Pyloric Stenosis Treated with Methyl Scopolamine Nitrate.

B. D. CORNER (*Arch. Dis. Childhood*, August, 1955) has treated with methyl scopolamine nitrate 117 unselected infants suffering from hypertrophic pyloric stenosis. Visible peristalsis and a palpable tumour were noted in all the patients by at least two experienced observers. All were admitted to hospital, and the need

is stressed for skilled institutional care, where this form of treatment is used. After gastric lavage a 5% solution of glucose-saline or Darrow's solution and glucose water in equal parts was given every two hours, the amount starting with two drachms and increasing two drachms every alternate feed. After twenty-four hours, if vomiting ceased, half-strength milk feeds were given alternately with water feeds, and the latter were omitted when the amount of each feed had reached two ounces. At this time a three-hourly or four-hourly feeding schedule was commenced, the feeds being gradually increased until adequate quantities were being given. Intragastric feeding was used for a few babies who were very ill. Methyl scopolamine nitrate, 0·1 milligramme, was given orally, six times daily fifteen minutes before each feed. If the vomiting recurred, the stomach was washed out, methyl scopolamine nitrate was given subcutaneously in a dose of 0·05 milligramme six times daily, and water feeds were recommenced. The infants were discharged from hospital when feedings and weight gain were progressing satisfactorily. Methyl scopolamine nitrate was administered until the age of sixteen weeks was reached. One infant died of infection (mortality rate, 0·8%), and one was submitted to operation because of failure to obtain a satisfactory response after nineteen days of medical treatment.

Mandibulo-facial Dysostosis.

J. McKENZIE AND J. CRAIG (*Arch. Dis. Childhood*, August, 1955) report the case of an infant with mandibulo-facial dysostosis (Treacher Collins syndrome) who died at the age of two and a half months and in whom careful dissections of the facial region were carried out. The minimal form of this syndrome is the presence of an anti-mongoloid slant of the palpebral fissures. In others there is, in addition, notching of the lower eyelids in association with hypoplastic malar bones. Much more extensive deformities may be found, including abnormalities of the auricles and middle ear, absence of parotid glands, micrognathia and even agnathia. On the basis of their dissections in this case the authors suggest that the syndrome arises through the presence of a defect in the stapedial artery. This arterial deficiency results in maldevelopment, not only in its own field of supply, but also in the region of the first visceral arch, whose vessels are dependent on the stapedial artery during a critical phase in development.

ORTHOPÆDIC SURGERY.

Lumbo-Sacral Fusion for Low Back Pain.

E. G. SHAW AND J. G. TAYLOR (*J. Bone & Joint Surg.*, May, 1956) have investigated the indications for lumbo-sacral fusion in the treatment of low back pain for non-infective lesions, and have tried to establish the reliability of the operation for conditions such as spondylolisthesis, intervertebral disk degeneration, and congenital anomalies. In this series 52 patients were treated by posterior cortical onlay grafting with fresh autogenous bone and without internal fixation. Of these patients, 71% were relieved of their symptoms, but bony fusion was obtained in only 60%. The authors consider that with this technique twelve weeks' immobilization in a plaster bed is required. Some failures are ascribed to the use of an insufficient quantity of bone or to poor apposition of the graft to its bed. It is evident that the more vertebræ which are used, the more difficult it is to succeed. When the diseased area is successfully fused, but an unnecessarily long graft has been used, a pseudarthrosis above the level of the pre-operative abnormality may be the cause of persisting backache. For these reasons, the authors believe that no attempt should be made to graft more vertebræ than are necessary to stabilize the local lesion. The complication rate, particularly from deep vein thrombosis, was high. The authors suggest that this major complication could perhaps be overcome by using banked bone. They conclude that if operation is performed only when there is a definite diagnosis and a limited extent of structural pathology, then excellent results can be expected when successful fusion is achieved. There will also be an appreciably high proportion of satisfied patients, even when bony fusion has not been obtained, presumably because there is a fibrous union strong enough to stabilize the affected spine.

Fractures of the Tibial Shaft.

N. J. BLOCKEY (*J. Bone & Joint Surg.*, May, 1956) records the results of work which has been aimed at testing the thesis that a method which fixes the bone ends rigidly is desirable in the treatment of fractures of the tibia and fibula in adults. A consecutive series of 33 patients treated by a technique which ensured rigid fixation is analysed together with follow-up results at one year. Of 31 patients with single fractures of all types, 29 walked without plaster at eight weeks and needed no further treatment. In the remaining two cases infection occurred, and this delayed recovery. The two patients with double fractures of the tibia walked without plaster at twelve weeks; they too needed no further treatment. Non-union did not occur in any fracture in this series. The author believes that rigid fixation of a fracture enables the process of repair to proceed more quickly than when movement is permitted, provided this rigid fixation can be obtained without jeopardizing the viability of the bone ends. The mechanical factors are discussed and a technique is described which provides a high degree of fixation without exposing any more than one surface of the bone. The fracture was tested for stability; if it was stable to a valgus force, but mobile to a varus force, a plate was fixed to the lateral surface of the tibia. In all other cases, 32 out of 33, there was no stability, and so the antero-medial surface was selected for the plate. With minimal periosteal stripping the fracture was reduced and held in a Charnley clamp, applied in many cases over some of the lateral soft tissues, to avoid stripping them. The only part of the bone from which periosteum was stripped was that part of the antero-medial surface where the plate was to lie. A seven-inch eight-hole Burns femur plate was used, and coarse stainless steel screws were inserted into seven sixty-fourth-of-an-inch drill holes to penetrate both cortices. "Butterfly" fragments were fitted in as well as possible, with care not to disturb their soft-tissue attachments. All wounds were sutured, including those of compound fractures, and external splintage was not applied. Knee and ankle movements were started the next day, and walking on the normal leg with the aid of crutches was encouraged. Between ten and fourteen days after operation the sutures were removed, and a posterior plaster shell was applied to protect the leg against accidental injury at home. The author concludes that the treatment of fractures of the tibia by the application of a plate may fail if rigid fixation is not achieved and maintained. Union may be very slow if the bone ends are widely stripped, but in this latter event, if the fixation is firm all along, union will result in time. In the absence of infection non-union does not occur in rigidly fixed fractures of the tibia. Delayed union is caused by death of bone ends, which may be attributable to injury, but must never result from wide periosteal stripping following plating techniques.

Non-Suppurative Osteitis Pubis.

L. L. WILTSE AND C. H. FRANTZ (*J. Bone & Joint Surg.*, June, 1956) report the occurrence, in 13 women, of a disease which, they believe, is a definite clinical entity related to, but not identical with, the condition *osteitis pubis*, which is seen occasionally in men, particularly after prostatectomy. The disease found in the 13 women was non-suppurative and non-inflammatory and developed in the anterior portion of the pelvic girdle. In five of the women the symptoms were first noted during pregnancy; in five others, the symptoms appeared within two months after delivery; in one, they appeared after extensive pelvic operations; in two they developed after an injury. The authors state that the typical female patient with this disease, who is usually a young woman, begins to experience pain in the region of the symphysis within a few months after the occurrence of some event capable of producing trauma in the adjacent structures. A physical examination reveals tenderness directly over the symphysis, although no swelling or fluctuation is seen. Blood and urine studies give normal results, and fever is absent or of low grade. Frequently, there is instability at the symphysis, as can be demonstrated by X rays, and the opposing sides of this structure will slip up and down as much as one-fourth of an inch when the patient steps from one foot to the other. The pain often becomes so severe that she is completely bedridden and can neither sit nor stand. The skiagrams made at the onset of symptoms will usually reveal no abnormality, but later, as the disease progresses, they will show spotty demineralization of the bone adjacent to the symphysis, widening of the symphysial gap and gradual development of sclerosis and narrowing. The disease is self-limited.

On the Periphery.

OF SUNDRY MATTERS PERTAINING TO WINCHESTER AND SOUTHWARK, AND ESPECIALLY TO THE LAST ILLNESS OF ONE STEPHEN GARDINER, BISHOP OF WINCHESTER AND PRINCIPAL SECRETARY OF STATE TO KING HENRY VIII.

THAT King Henry VIII had many wives is one of those delectable items of history which every schoolboy knows. He knows, of course, because it is one of the few "human interest" stories within the covers of his text-book to suggest that history was made as much by vulnerable mortals as by a special race of demigods. My own ignorance of the tremendous significance of Henry's matrimonial affairs to the course of English political and religious history is a matter of neither interest nor importance, but the manner in which it was partially dispelled is a story strangely full of medical and human interest. It moves from the dignity of a cathedral city to the dust and warehouses of Southwark, thus providing a fortuitous and even paradoxical link between the religious controversy of Henry's England and the theatrical triumphs of his daughter's reign.

Winchester, England's former capital, city of Alfred, Athelstan and Canute, is a curious town. It hangs the famous Round Table high on the wall of a room in the old castle. The room has been so partially and haphazardly converted into a modern courtroom as to give one the embarrassing impression of having trespassed backstage during rehearsals. Outside one of the city gates, near the castle, is an obelisk, in the middle of an intersection. On it is inscribed:

This MONUMENT
Is Erected
By the SOCIETY OF NATIVES
On the very SPOT OF GROUND
To which the MARKETS were removed
And whose Basis is the very STONE
On which the EXCHANGES were made
Whilst the City lay under the Scourge
Of the DESTROYING PESTILENCE
In the Year
Sixteen hundred Sixty Six

The monument was originally erected in 1759, the Society of Natives having been founded in 1669 for the relief of widows and orphans of citizens who died in the Great Plague.

Winchester Cathedral has a simple, almost stark, exterior. Within it lie the remains of the early kings of England, and notably those of King Canute, also known to schoolboys because of the human interest element in the story of his alleged defiance of the sea. Within it, too, is a chantry, said to be of inferior workmanship and design, dedicated to Stephen Gardiner, one-time Bishop of Winchester and Principal Secretary of State to King Henry VIII. The tomb might well be passed without comment, but—and it is here that the story should have begun—for certain striking features of his effigy, which is rather damaged and surprisingly naked. The cheeks are hollowed and the eyes sunken, the whole frame is grossly emaciated, and the abdomen is extremely scaphoid. The stature is short, and the lower ribs are sunken below the level of the iliac crests; the legs, except for their thinness, seem anatomically normal. It is rare for so vivid a picture of the relentless progress of disease to appear upon a tomb, and with the clue that vertebral collapse was probably part of the syndrome, it appeared worth while to find out more about Stephen Gardiner and his last illness. So indeed it proved.

Stephen Gardiner was born in the last decade of the fifteenth century at Bury St. Edmunds. His Cambridge education began in 1511; there he would have known the quaint round church of the Holy Sepulchre, which is one of the relatively few buildings which remain. He graduated as a Bachelor and later Doctor of Civil Law (the law of the Roman Empire and the foundation of international law) and Doctor of Canon Law (the law of the Church, which covered a very wide field in those days, even in England). In 1524 he entered the service of the powerful Cardinal Wolsey. There he gained such rapid preferment as to be selected in 1526 as one emissary to Pope Clement. His task was to obtain a favourable decision in the matter of King Henry's claim that his marriage to Catherine of Aragon was illegal. There was some reasonable basis for this assertion, as a special papal order had been necessary for the marriage to take place in the first instance. On the other hand, from the Pope's point of view, to agree to Henry's request for an annulment would have been to commit a crass diplomatic blunder. At the time, Charles V, Catherine's nephew, was ruler of most of Europe, including Rome, which the Pope had been obliged to vacate; Charles could not be expected to view Henry's move with favour, especially as it would lead to Catherine's daughter Mary being regarded as illegitimate. In this apparently hopeless situation, Gardiner's eloquent and reasoned appeals achieved a measure of success; his return was precipitated partly by his having become "sore sick of the flux".

Gardiner's advancement continued on his return, this time at the expense of his patron Wolsey; in 1529 he succeeded the unfortunate Cardinal in the most influential office in the Kingdom, that of Principal Secretary to the King. Two years later he also became Bishop of Winchester, a wealthy diocese second in importance only to Canterbury; it then included Southwark, where the church of St. Mary Overies (now Southwark Cathedral) adjoined the Bishop's palace. In spite of these royal favours, Gardiner fearlessly opposed Henry in the next year, when the King attempted to restrict the wide activities of the powerful Convocation of Bishops. This was the first significant indication of Gardiner's conservative attitude to religious and church affairs. Furthermore, after Henry's divorce had been obtained, at the cost of a breach with Rome, Gardiner opposed several measures adopted by Parliament which might be described as anticlerical and antipapal. On the other hand, he agreed to acknowledge royal supremacy and to renounce the allegiance to Rome previously demanded of all bishops. In fact, he returned to favour at court with the publication of his book *De Vera Obedientia Oratio* (to the King, essentially). He was appointed ambassador to France. He was in Paris when Anne Boleyn was executed, and when Jane Seymour died after bearing the future Edward VI. He missed, too, the completion of the dissolution of the monasteries, the sacking of many churches and the destruction of many images. One wonders what Gardiner's reaction was to the destruction of Thomas à Becket's shrine at Canterbury—there was another to whom his king's conferring of a bishopric did not mean a lifetime of subservience.

It was convenient for all that Gardiner returned to England at a time when it was internationally politic for Henry to proclaim and demonstrate his orthodoxy in matters of religion. He had, after all, been given the title of *"fidei defensor"* by Pope Leo X, and twenty years before he had written a book refuting Lutheran doctrines. Gardiner was in time to play an important part in the fall of Catherine Howard, on the grounds of her alleged premarital misconduct. As Catherine was Roman Catholic, this was a blow to the hopes of those with conservative religious views, despite the King's lack of support for the Protestants at this juncture. Gardiner married Henry to his last wife, Catherine Parr, in 1543.

But troubles of a serious kind were brewing for the Bishop of Winchester. More and more he found himself in opposition to Cranmer, Archbishop of Canterbury, whose doctrinal views were distinctly less conservative than his own. To Gardiner, Cranmer's attitude was not merely antipapal, an attitude which he himself had taken, but also anti-Catholic; on matters of religious principle Gardiner would make no compromise. Gardiner and the conservative or orthodox religious party lost the struggle for power during the regency which followed Henry's death in 1547. So it was for reasons of doctrine that Gardiner suddenly found himself in Fleet prison, without his cook, his servants or visitors, "nor liberty to use physician for relief of disease, whereof I have need". Though the Stoics taught contempt of pain, he continued, no doubt they shrank a little when "any disease nipp'd them . . . . And my stomach nippeth me, which I have favoured as much as any man in England, and have laden it as light, either with meat or drink of many years . . . as any other. And after I saw I could get no answer from your Grace for a physician I have left off such study as I used, and given myself to continued walking for exercise." A week later a physician was allowed to visit him.

After a short interval of freedom Gardiner was again imprisoned, this time in the Tower, "a dankish and uncomfortable house", his servant observed, for one "much given to rheums". Shortly before this, Gardiner had been "much diseased of a fistula", and also from "a great rheum . . . which caused one side of the head to be much swollen". During his long sojourn in the Tower he was visited by both his physician and his chaplain, on account of a fever: a death from pestilence had occurred in an adjacent room.

By 1553, on the death of young Edward, Gardiner may have cared little when supporters of the Earl of

Northumberland seized the Tower, and he was told of his impending execution. However, for some reason this was delayed, so that when the abortive attempt to place Lady Jane Grey on the throne failed and Mary was proclaimed Queen a few days later, Gardiner was released. Mary, as Catherine of Aragon's daughter, was, of course, a devout Roman Catholic. Gardiner's bishopric was restored in time for him to crown her, and he immediately took office as Lord Chancellor.

They were troubled times. The Queen desired reunion with Rome, which was ultimately achieved. The country, in general, was antipapal although pro-Catholic, despite a relatively strong Protestant influence in cosmopolitan London. The reintroduction of the older forms of worship met a setback when Archbishop Cranmer published a pamphlet in which he observed that the attempt to revive the Mass was the work of the devil; it was his turn to spend some time in the Tower. Gardiner ineffectually opposed Mary's unpopular marriage with Philip of Spain, and the resultant liaison of Spain and England. Sir Thomas Wyatt led an unsuccessful rebellion in Kent, which would probably have led to the crowning of Elizabeth. Paradoxically enough, it seems that Gardiner, in shielding his friend Courtenay from the consequences of his part in the uprising, probably also shielded Elizabeth; he well knew, and feared, her Protestant leanings and her sympathy with the New Learning. The reenactment of heresy laws, repealed some years earlier, led to some brutal executions; Gardiner's part in these is debatable. One almost contemporary account of his attitude is interesting for its medical information, for the Bishop's health was failing:

> However (bloody as he was) for mine own part I have particular gratitude to pay to the memory of this Stephen Gardiner, and here I solemnly tender the same. It is on the account of Mrs. Clarke my great grandmother . . . whose husband rented Farnham Castle, a place whither Bishop Gardiner retired . . . . This Bishop, sensible of the consumptionous state of his body, and finding physic out of the kitchen more beneficial than that out of the apothecaries' shop [*sic*] [or, incidentally, out of the personal medicine chest of no less a person than the Emperor Charles V], and special comfort from the cordeals she provided him, did not only himself connive at her "heresy" as he termed it, but also protected her during his life from the fury of others.

Indeed, Wily Winchester, as he was known (had he not taken a house in the fields at Stepney on the pretext of escaping from a London epidemic of the sweating sickness, with the deliberate intention of meeting a certain foreign ambassador, a near neighbour, as if by accident?), was suffering from his last illness. By September, 1555, he had "fallen into such a state of oppilation that by degrees he got dropsy as well as jaundice, . . . his physiognomy being so changed as to astound all who saw him". It was fifteen years since a contemporary had described him as well-proportioned, vigorous, poised and alert, but no doubt his recent privations had already taken their toll. A month later he was conducting affairs of State from his house. His condition had deteriorated further, so that although he was able to walk he could scarcely get upstairs. Thereafter, so it is said, he "rotted alive", and "ere he died such a rank savour steamed from all his body that none of his friends were able to come at him, but that they were ready to vomit".

But the Bishop of Winchester was to hold the centre of the stage once more, in a short hour of triumph of mind over matter. He had been one of the last to acknowledge the bitterly disappointing truth that Mary's supposed pregnancy was in fact a dropsy, that she would never have a child to succeed her. Spurred on by his religious convictions and his fears for the future if Elizabeth became Queen, he attended the opening of Parliament, riding to Westminster on a mule. Here, to the wonderment and admiration of all, he "surpassed himself in ability, eloquence, discretion and piety", bearing himself "as to show no sign of corporal infirmity". "The marvellous good hope of his recovery" held out by his optimistic physicians after this were proved unfounded, for on November 12 he died in Wolsey's former palace of Whitehall.

Within four hours of his death his body had been conveyed to his own palace at Southwark; within six hours, we are informed, his bowels had been buried before the high altar at St. Mary Overies. The body was opened, according to one report, to allay the suspicion that he had been poisoned on a visit to France earlier in the year, but how this diagnosis was to be established is not stated. As will appear, there were more practical reasons for the procedure. The autopsy information recorded is unfortunately scanty. It is known that ". . . his entrails [were] taken forth and closed up in two pots of a gallon and a half apiece; and the water within his body reserved in a great kettle. The quantity of water was seven gallons . . . . And after . . . he was dried and put into his winding sheet . . . and other vestments put upon him." The body was then wrapped in lead, but owing to the inclemency of the weather it was not possible to begin the long journey to his final resting place at Winchester until February, just four hundred years ago.

Such were the last days of a remarkable man, graphically recorded in the blunt language so characteristic of what was soon to become Elizabethan England. His effigy, completed in 1556, bears eloquent witness to his sufferings. The unknown sculptor must have faithfully reproduced what he saw; the scaphoid abdomen leaves no doubt, in view of the necropsy findings, that his work was done after Gardiner's death.[1]

Let us return for a brief time to Southwark. The cathedral—there is scarcely room for it between London Bridge, the river and the sprawling warehouses—is on the site of a nunnery founded in 607. Later it was a priory, but it became a parish church in 1504. Fifty years later part of it was in use as a court for heresy trials; in the reign of Queen Elizabeth it was leased to a baker. Some early parts of the buildings remain, but the chief attraction for tourists is the memorial to Shakespeare. Elegantly attired, the poet reclines on a stone slab on his side, head in his hand, with elbow bent; it is impossible not to feel sympathy for him, condemned to stay in this distressing position for centuries. Shakespeare, who is believed to have lived for a time in the district, probably attended the church at least once, for his brother Edmund, "a player", was buried there. Roughly between the church and the site of the Bear Garden (in the vicinity of Shakespeare's supposed lodgings) is the site of the Globe Theatre, now marked by a suitable memorial stone set in the wall of Barclay's brewery. Close by is Clink Street, which takes its name from its proximity to the Bishop's prison, an offshoot of his palace. According to the temper of the times it held chiefly either Protestants or Roman Catholics for the greater part of a century, although during an epidemic of plague the palace was once used to confine eight hundred vagrants awaiting deportation to the Low Countries. Among the notable inhabitants of the Clink was Sir Kenelm Digby, pirate, philosopher and scientist, who wrote his "Observations" upon Sir Thomas Browne's "*Religio Medici*" there. He is best known in medical history for his ardent advocacy of the "powder of sympathy". Digby was a friend of Ben Jonson. To bring us back to Southwark, it was at the Hope Theatre, built by an opposition company close to the Globe after the latter had been burnt down, that Jonson's rollicking comedy "Bartholomew Fair" was first produced. Indeed, the ghosts of great men must wander sadly among the Bankside warehouses seeking vanished glories—Fletcher, Alleyn, Henslowe, Beaumont, Field, Massinger and hosts of others, who visited the theatre; Thomas à Becket, James I of Scotland, Henry VIII of England, Queen Mary and Philip of Spain, who visited the palace. Little remains of the latter, although the basic plan may be traced. It was damaged during the Wyatt rebellion, when it was Gardiner's residence. After his death it seems to have been lived in only sporadically. After use as a prison for Royalists, it was returned to the Church at the Restoration, but it was no longer used as a bishop's house. Its glory had departed; already its parks had been invaded by the growing canker of warehouses and tenements.

An epitaph, dated 1672, upon a tomb in Southwark Cathedral forms a fitting epilogue to our tale of the fluctuating fortunes of a man, and, in some measure, of a district:

> Here Lockyer lies interr'd, enough; his name
> Speakes one hath few competitors in fame;
> A Name, so Great, so Generall't, may scorne
> Inscriptions wch. doe vulgar tombs adorne:
> A diminution 'tis to write in verse
> His eulogies, wch. most men's mouths rehearse.
> His virtues & his PILLS are so well known
> That envy can't confine them under stone,
> But they'll survive his dust and not expire
> Till all things else at th'universall fire.
> This verse is lost; his PILL Embalmes him safe
> To future times without an Epitaph.

Time has dealt harshly with them all.

[1] The manuscript of this essay has been criticized on the grounds that it fails to offer a diagnosis. All the available clinical information is presented, and I am loath to spoil an excellent case for commentary by providing my own. The past history of typhus and erysipelas is probably irrelevant, but the dyspepsia and pain of the same period are possibly significant. Is the evidence for vertebral collapse related to the riding of the mule? It is tempting to suggest that the fetor . . . but the temptation is better resisted.

Acknowledgements.

The account of Gardiner's life and illnesses is based almost entirely on J. A. Muller's "Stephen Gardiner and the Tudor Reaction" (Society for Promoting Christian Knowledge, London, no date). I have also borrowed freely from Canon A. P. Stevens's two pamphlets, "Shakespeare in Southwark" and "Winchester Palace in Southwark", and, less freely, from "Ben Jonson of Westminster", a most readable biography by Marchette Chute (Hale, London, 1954).

BRYAN GANDEVIA.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

GOVERNMENT AND GENERAL ORDERS: CIVIL DEPARTMENT.[1]

Government House
Parramatta
Monday 11th October 1819

JAMES BOWMAN Esquire Surgeon in the Royal Navy, having arrived per ship John Barry bearing his Royal Highness the Prince Regents Commission as Principal Surgeon in this Territory in the room of D'arcy Wentworth Esquire resigned, and it being necessary on the part of each of those Gentlemen that a minute and accurate Survey of the Medicines and Medical Stores belonging to the Department of Principal Surgeon should take place previous to Mr. Wentworth's delivery over the charge of that Department His Excellency the Governor is pleased to order and direct that a Committee consisting of the following medical Gentlemen namely—John Harris Esquire late Surgeon of the 102nd Regt.; Lancelot Armstrong Surgeon in the Royal Navy, late Surgeon Superintendent of Convicts per ship Daphne; and Daniel Macnamara Esquire also Surgeon in the Royal Navy, late Surgeon Superintendent of Convicts per Ship Canada, do assemble at the hour of eleven in the forenoon of Thursday next at the General Hospital in Sydney and there survey the medicines and medical stores of whatever kind, now in charge of the Principal Surgeon, and that they continue daily so to assemble until they shall have finally completed the object of their survey and that they report thereon in writing under their respective Hands and Seals to His Excellency in charge of the Civil Medical Department of this Territory.

His Excellency further orders and directs that D'arcy Wentworth and James Bowman Esquires do attend upon and tender such Assistance to the Committee as may be within their power in order to facilitate the duty now assigned to the said Committee.

By His Excellency's Command.

J. T. CAMPBELL Secy.

Correspondence.

FACTORS AFFECTING THE MORTALITY OF SMALL-BOWEL OBSTRUCTION.

SIR: Mr. Neville Davis (M. J. AUSTRALIA, December 8, 1956) states that "Mechanical intestinal obstruction in the early post-operative period . . . is not safely treated by intubation as a definitive measure. This has been shown by a series of such cases occurring in the Brisbane Hospital (Davis, 1956, *Australian & New Zealand J. Surg.*, 25: 161). Once the diagnosis is made, early operation is necessary".

The clinical notes of these cases, in my opinion, do not justify such a conclusion. Of his 20 personal cases of early mechanical post-operative obstruction quoted in this paper six died, and in five of these he regarded death as possibly resulting from undue delay in operating, and following a trial of intubation suction. His records show that in all five, either the form of intubation, the character of the suction, or the intravenous therapy were inadequate according to the standards I advocate.

Thus, in his Case 3, laparotomy was not done until three days after diagnosis was possible, and one day after it was certain, and then was not preceded or followed by intubation suction. The case was one of obstruction from involvement in a post-operative abscess, and operation resulted in perforation of the bowel during freeing from the abscess wall, and eventual death from resultant fistula. Obstruction associated with post-operative abscess formation is best treated initially and often definitively by drainage of the abscess combined with adequate intubation and intravenous therapy.

In his Case 4, he admits the death was due to delay in diagnosing a non-resolving closed loop obstruction. Miller-Abbott intubation was not commenced until seven days after distension was observed, and after strong clinical evidence of a strangulated closed loop had been present for four days. He states: "In view of the failure of intestinal intubation, operation was performed." Neither delay in diagnosis of the strangulating obstruction nor death were due to failure of intestinal intubation. At the stage it was used, the correct diagnosis was apparent, as was the proper treatment—namely, operation following a short period of pre-operative preparation by intestinal intubation and resuscitation, these being continued into the post-operative phase.

In his Case 5, suction was by duodenal tube, intravenous therapy being commenced two days later. Intestinal intubation was not used, and one factor delaying operation was a diagnosis of uræmia on the basis of a blood urea of 194 milligrammes *per centum*. It is common to find a high blood urea coincident with unrelieved distension. Following decompression, it soon returns to the patient's normal.

His Case 6 illustrates one major disadvantage of urgent operation without at least some preliminary intubation suction. Urgent operation was performed for obstruction in a pregnant woman, but not all the obstructive bands were divided, death eventually resulting from a further obstruction not discovered at operation. As Mr. Davis stated: "Almost certainly the original obstruction was caused by multiple bands, not all of which were divided at the original operation." Even when obstruction is regarded as desirable, some preliminary intubation results in decompression of the bowel proximal to the most proximal block, and this is of great value in facilitating operative manipulation as well as identification of the most proximal block. If distension is present distal to the first obstruction found, then other obstructions are present, and must be found, and can be found if the surgeon is not hampered by grossly distended bowel, possibly combined with pregnancy, as in this case, or obesity.

In his Case 7, suction was by duodenal tube only.

In Case 8, no suction was used until after one month of intermittent post-operative obstruction, and two laparotomies. One wonders if the outcome may have been different if intestinal intubation had been commenced when obstruction first became apparent on the third post-operative day.

Mr. Davis, in his paper, recommends that post-operative distension should be treated initially by intermittent aspiration, using a duodenal tube. He does not use an intestinal tube for the reasons that "it is extremely difficult to persuade the tube to pass the pylorus", and "because of lack of time and radiological facilities in a busy institution".

None of these are valid reasons, and it is apparent that his case reports do not justify his statement in his letter to this journal of December 8 that "mechanical intestinal obstruction in the early post-operative period is not safely treated by intubation as a definitive measure". To the contrary, there is no doubt that the treatment of choice in early post-operative obstruction is the combination of intestinal intubation, continuous suction and adequate intravenous therapy.

Vomiting occurring after the first post-operative day should be regarded as obstructive until proved to the contrary, and without delay these three measures should be commenced without awaiting more accurate diagnosis, and should be continued until operation is indicated or resolution has occurred. In the majority it will be the latter.

Continuance in the use of the old term "ileus" is unfortunate. It implies in the minds of many a paralytic condition, as does "early post-operative obstruction" suggest

[1] From the original in the Mitchell Library, Sydney.

a mechanical obstruction. It is better to speak merely of obstruction, regarding it, as has been magnificently described by Crowley and Johnston (1941), as a condition in which paralytic, mechanical and strangulating factors may be present simultaneously or in succession.

Early post-operative obstruction is usually mechanical, and from buttery fibrinous adhesions. The earlier it appears the less likely these will have changed into peritoneal adhesions, the more likely is permanent resolution to follow adequate intubation suction and resuscitation, and the greater the chance that operation will be followed by further obstruction and further operation if the patient is unfortunate enough to be in the hands of an advocate of immediate operation without suction.

Mr. Davis further comments that the signs of strangulation I enumerated do not always occur. This is very true, but initially successful intubation does not mask these signs. To the contrary, the decompression of bowel above the proximal block usually results in improvement in the patient's general condition, and in the general abdominal signs, but these reveal rather than disguise the localized signs suggestive of strangulation.

Persistence of a fæculent character in the aspiration is not necessarily an ominous sign. It is often due to suction being inadequate either because of the tube or the apparatus, or of its supervision. It may also occur when the most proximal obstruction of a closed loop is resolving.

This day I asked the surgical registrars of the Geelong Hospital how many cases during the last year of early post-operative obstruction under all surgeons had required operation after intestinal intubation, continuous suction and intravenous therapy were used in the manner I advocate. The answer was "none".

This day I asked the pathologist of the Geelong Hospital, Dr. V. Plueckhahn, who three years ago instituted post-mortem examination in all deaths, how many deaths had occurred in which early post-operative obstruction was treated by the same methods, and in the manner I advocate, either alone or with operation. The answer was "none".

These impressions are to be checked with the records.

Deaths have occurred where suction and intravenous therapy have formed part of the treatment, but in all cases such were not up to the standards given in my papers in your journals of November 3, 1956, and March 3, 1951, page 317.

Yours, etc.,

CHARLES GALE.

Reference.

CROWLEY, R. T., and JOHNSTON, C. G. (1941), "Therapeutic Considerations in Acute Obstruction of the Small Bowel", *Surg., Gynec. & Obst.*, Volume LXXIII, July, 1941; *Internat. Abst. Surg.*, 73 : 1.

A CORRECTION.

SIR: Thank you for inserting the report of our joint meeting with the Royal College of Obstetricians and Gynæcologists in the edition of October 27, 1956. An error occurred which was entirely our fault—the subject of the lecture was "Postmaturity", not "Postmaternity". I would be grateful if attention could be drawn to this in a subsequent issue of your journal.

Yours, etc.,

W. J. HAMILTON,
Honorary Secretary, The College of General Practitioners (Queensland Faculty).
225 Wickham Terrace,
Brisbane,
December 10, 1956.

EMIL KRAEPELIN, HAVELOCK ELLIS AND SIGMUND FREUD.

SIR: Investigations by the Research Officer into the files of the Colonial "Department of Agriculture and Public Instruction" for the last century have convinced him (and me) that Ellis started teaching at "Fort Street Normal School", not at Paddington. Mr. David S. Macmillan,

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED DECEMBER 8, 1956.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	4(2)	6(3)	1	1	..	..	1	..	13
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	1(1)	1	..	..	..	1	..	3
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	..	12(9)	11(2)	..	..	..	..	..	23
Diphtheria	2	..	1(1)	..	3(3)	..	..	..	6
Dysentery (Bacillary)	..	4(4)	4(3)	5(5)	..	..	1	..	14
Encephalitis	2(1)	2(2)	..	..	..	..	..	..	4
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	82(50)	33(9)	..	13(4)	..	..	1	..	129
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	1	..	..	..	..	..	1
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	..	1(1)	4(2)	1(1)	..	2	..	..	8
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	3(2)	1(1)	..	..	..	..	..	..	4
Puerperal Fever	2(1)	..	3	..	..	..	..	..	5
Rubella	..	78(37)	2(2)	97(57)	3(3)	..	..	..	180
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	11(6)	11(6)	7(1)	10(5)	1(1)	2(2)	..	..	42
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	..	..	..	..	..
Trachoma	..	..	..	..	2	..	..	..	2
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	42(25)	20(14)	15(8)	2	8(4)	6(1)	1	..	94
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	1	..	1(1)	..	..	..	2
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Archivist to the University of Sydney, has proved that the entry in the Matriculation Register is "Henry Ellis", and thirdly I am now convinced that Ellis gained no medical "degrees" in London, he merely became an L.S.A. Moreover, I misspelled H. L. Menken's name. Also in searching my filing cabinet to prove these three inaccuracies (in one short letter to the journal) I came across a ten-inch flat circular disk with a central hole in it. Surely this is a record.

Yours, etc.,

607 New South Head Road,
Rose Bay,
New South Wales.
December 14, 1956.

G. HARRIS.

Research.

NICHOLS FELLOWSHIP.

THE Council of the Royal Society of Medicine invites applications for a grant of £225 *per annum* in aid of research to be carried out to advance knowledge in obstetrics and gynæcology, which will be awarded on the recommendation of the Council of the Section of Obstetrics and Gynæcology of the Society. The place at which the work is to be carried out and an outline of the proposed research must be stated in the application. A preliminary report on the progress of the research must be submitted at the expiration of the first six months. The Fellowship will be awarded in the first place for a period of one year and, at the discretion of the Council, may be extended for a second year. Applications must be received by the Secretary, Royal Society of Medicine, 1 Wimpole Street, London, W.1, by May 18, 1957, and candidates must state their position with regard to call-up for military service.

Congresses.

SEVENTH INTERNATIONAL CANCER CONGRESS.

THE seventh International Cancer Congress, sponsored by the International Union Against Cancer, will be held in London, England, from July 6 to 12, 1958, under the presidency of Sir Stanford Cade. Congress headquarters will be the Royal Festival Hall. There will be two main sessions of the congress: (a) experimental, (b) clinical and cancer control. Special emphasis will be placed on hormones and cancer, chemotherapy, carcinogenesis and cancer of the lung.

Proffered papers will be considered only if submitted with an accompanying abstract (not over 200 words) before October, 1957, and if dealing with new and unpublished work.

The registration fee for the congress will be £10, and the latest date for registration without late fee will be January 1, 1958. Registration forms and a preliminary programme will be available early in 1957 on application to the Secretary General, Seventh International Cancer Congress, 45 Lincoln's Inn Fields, London, W.C.2, England.

Notice.

THE ORTHOPTIC COUNCIL OF NEW SOUTH WALES.

A COURSE of instruction in orthoptics of two years' duration for a limited number of successful applicants will be conducted by the Orthoptic Council of New South Wales commencing in February, 1957. Applicants, who must be eighteen years of age (if possessing Leaving Certificate or equivalent, seventeen years of age), should apply to the Secretary, Dr. M. Sterling-Levis, "Beanbah", 235 Macquarie Street, Sydney, by January 26, 1957, submitting suitable reference and stating educational standards.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Phillips, Richard Arthur Carlisle, M.B., B.S., 1955 (Univ. Sydney), 53 Cabramatta Road, Mosman.

Corrigendum.

AN error occurs in the report of the Tenth General Assembly of the World Medical Association published in the issue of December 15, 1956, at page 908. Under the heading "New Member Association" the statement is made that the New Zealand Branch of the British Medical Association has 810 members. This figure should be 1810.

Diary for the Month.

JAN. 7.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JAN. 8.—New South Wales Branch, B.M.A.: Council Quarterly.
JAN. 11.—Queensland Branch, B.M.A.: Council Meeting.
JAN. 11.—Tasmanian Branch, B.M.A.: Branch Council.
JAN. 14.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
JAN. 15.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JAN. 17.—Victorian Branch, B.M.A.: Executive Meeting.
JAN. 17.—South Australian Branch, B.M.A.: Council Meeting.
JAN. 23.—Victorian Branch, B.M.A.: Council Meeting.
JAN. 25.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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